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# **University of Southampton**

Faculty of Environmental and Life Sciences

School of Psychology

## **Promoting the Mental Health of Children with Anxious Mothers and Fathers: Examining Risk Factors and Parents' Needs**

by

**Francesca Zecchinato**

ORCID ID [0000-0002-4639-8830](https://orcid.org/0000-0002-4639-8830)

Thesis for the degree of Doctor of Philosophy

April 2025

# University of Southampton

## Abstract

Faculty of Environmental and Life Sciences

School of Psychology

Doctor of Philosophy

### **Promoting the Mental Health of Children with Anxious Mothers and Fathers: Examining Risk Factors and Parents' Needs**

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Francesca Zecchinato

The rising rates of mental ill-health among children and young people represent a pressing global concern and are currently recognised as an international health priority. Investing in prevention has been identified as a key solution to limit these increasing rates and mitigate the associated burden. However, to develop and implement effective prevention strategies, it is crucial to identify the risk factors contributing to youth mental ill-health. Existing literature indicates that parental mental illness is an important, modifiable, risk factor for child mental ill-health. Among all the psychiatric conditions in the general population, anxiety disorders are the most prevalent worldwide, particularly in parents. This thesis, therefore, focuses specifically on the risk posed by parental anxiety to their children and explores strategies to promote the mental health of children with anxious parents.

In Chapter 1, I (i) review the theoretical and empirical evidence related to the importance of parents for child development and the impact of parental mental illness, including anxiety symptoms and disorders, on child mental health outcomes, and (ii) highlight current limitations in the available literature on parental anxiety and child mental health. In the empirical work presented in the following chapters (2-4), I address some of these knowledge gaps. Specifically, in Chapter 2, I focus on our limited understanding of the role played by fathers and present a comprehensive systematic review and meta-analysis showing that paternal anxiety is significantly associated with offspring emotional and behavioural difficulties with small and small-to-medium effect sizes. In Chapter 3, I examine the specific contributions of paternal perinatal anxiety and attempt to disentangle the differential effects of prenatal vs postnatal exposure to paternal anxiety on later child mental health outcomes. In a prospective longitudinal study, using data from a large UK-based birth cohort, I show that paternal perinatal anxiety is a unique risk factor for child mental ill-health, even after accounting for maternal mental health, child temperament and sociodemographic variables, and highlight different patterns of associations at different child ages. In Chapter 4, I address the current lack of understanding of how to support anxious parents in promoting mental health among their children and present a qualitative study that provides insights into what an accessible and acceptable preventive service should entail. Findings from the three empirical chapters are discussed collectively in Chapter 5 and reviewed in the context of the broader literature presented in Chapter 1. In Chapter 5, I also discuss the implications of the findings for research and clinical practice and indicate directions for future research, highlighting the importance of involving both mothers and fathers in the promotion of child mental health.

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## Research Thesis: Declaration of Authorship

Print name: Francesca Zecchinato

Title of thesis: Promoting the Mental Health of Children with Anxious Mothers and Fathers: Examining Risk Factors and Parents' Needs

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. Parts of this work have been published as:-

Zecchinato, F., Ahmadzadeh, Y. I., Kreppner, J. M., & Lawrence, P. J. (2024). A Systematic Review and Meta-Analysis: Paternal Anxiety and the Emotional and Behavioral Outcomes in Their Offspring. *Journal of the American Academy of Child & Adolescent Psychiatry*.  
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Signature: ..... Date: 04/04/2025

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*My PhD was funded by the ECRC South Coast Doctoral Training Partnership.*

These fears that are huge  
in your head right now,  
the loops of words and  
unhelpful thoughts,  
that are making you  
anxious and unhappy,  
they are not premonitions  
of what is gonna happen,  
they are stories and memories,  
they are not prophecies  
of what happens next -  
who knows what happens next?

Nobody knows.

So sit with this page now  
take a deep breath  
give time a chance  
make some room  
make some space  
so that something  
truly miraculous  
can happen  
next.

*Your Fears Are Not Prophecies*, Rachel Wiley

## Definitions and Abbreviations

|              |                                                           |
|--------------|-----------------------------------------------------------|
| ALSPAC.....  | Avon Longitudinal Study of Parents and Children           |
| AD .....     | Anxiety Disorder                                          |
| CAMHS .....  | Child and Adolescent Mental Health Service                |
| CYP.....     | Children and Young People                                 |
| DAWBA .....  | Development and Wellbeing Assessment-Parent Questionnaire |
| DSM.....     | Diagnostic and Statistical Manual of Mental Disorders     |
| ICD .....    | International Classification of Diseases                  |
| NHS .....    | National Health Service                                   |
| PPI .....    | Patient and Public Involvement                            |
| RRPSPC ..... | Revised Rutter Parent Scale for Preschool Children        |
| RTA .....    | Reflexive Thematic Analysis                               |
| SES .....    | Socioeconomic Status                                      |
| WHO .....    | World Health Organization                                 |

# Chapter 1 Introduction

## 1.1 The Problem: A Crisis in Children's Mental Health

We are increasingly faced with alarming information regarding a surge of mental health problems among children and young people (CYP), as reflected in recent newspaper articles (e.g., Gregory, 7 February 2024; Gregory, 27 August 2024). In the United Kingdom (UK), the latest follow up report to the 2017 Mental Health of Children and Young People survey, conducted in 2022, indicates that rates of a probable mental disorders rose from 1 in 9 (12.1%) in 2017 to 1 in 6 (16.7%) in 2022 among children aged 7 to 16 years, and from 1 in 10 (10.1%) in 2017 to 1 in 4 (25.7%) in 2022 among children aged 17 to 19 years (Newlove-Delgado et al., 2022).

Echoing the concerns related to a deterioration of youth mental health, a global consortium of world-leading psychiatrists, psychologists, academics, and young people have worked together in the past few years to deliver a thorough analysis of the worldwide state of youth mental health, recently published as a Commission in *The Lancet Psychiatry* (McGorry et al., 2024). Overall, the Lancet Psychiatry Commission on youth mental health highlighted the need to recognise youth mental health as an international health priority, calling for urgent global action (McGorry et al., 2024).

Mental health is defined by the World Health Organization (WHO) as “a state of wellbeing in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community” (World Health Organization, 2022). It is estimated that across the lifespan, one of every three individuals experiences mental-ill health (an umbrella term that includes time-limited episodes of ill-health with a need for care as well as more sustained, recurrent, and disabling forms of ill-health, better captured by the term mental illness; Steel et al., 2014). As a note, in this thesis, I primarily use the term *mental illness* to refer to clinically significant psychological conditions (psychopathology) that impact an individual's functioning. However, I

also occasionally use the term *mental disorder* interchangeably, as it is widely used in clinical and research contexts to denote diagnosable conditions classified in diagnostic manuals such as the Diagnostic and Statistical Manual of Mental Disorders (DSM) and the International Classification of Diseases (ICD). Both terms aim to encompass a range of conditions impacting mental health, while acknowledging some variability in their public and clinical connotations. When referring to child poor mental health, or mental ill-health, I also use the terms emotional and behavioural difficulties or problems, particularly when referring to child mental health outcomes assessed with questionnaires that distinguish between emotional (i.e., difficulties within the self that are less readily observable, such as anxiety, depression, social withdrawal, and somatic symptoms) and behavioural (i.e., observable behaviours, such as conflict with others, aggression, rule-breaking, and behavioural dysregulation, including hyperactivity) mental health difficulties (e.g., the Revised Rutter Parent Scale for Preschool Children [RRPSPC]; Elander & Rutter, 1996), or probable psychiatric disorders, when referring to mental health outcomes assessed with measures that generate probable psychiatric diagnoses (e.g., the Development and Wellbeing Assessment-Parent Questionnaire [DAWBA]; Goodman, Ford, Richards, Gatward, & Meltzer, 2000).

Accumulating research evidence shows that the prevalence of mental ill-health among CYP had steadily increased over the past two decades, and then surged - driven by the COVID-19 pandemic and its aftermath (McGorry et al., 2024). Although most of the robust epidemiological data available to monitor mental ill-health trends comes from high-income countries, existing evidence from low- and middle-resource settings also shows a substantial and urgent need of mental health care for CYP (Doyle et al., 2023; Ma et al., 2021; Maalouf et al., 2022), which is creating profound negative consequences for young people, their families, and the economy at local and global levels (McGorry et al., 2024).

There are many proposed explanations for this rise in reported rates of mental ill-health among CYP. The growing, unregulated use of social media, particularly among adolescents, may contribute to social pressures, mental ill-health, and reduced life satisfaction (Orben,

2020; Twenge, 2017). However, the evidence is still emerging and points to a complex, bidirectional relationship between social media use and adolescent mental health (Orben, 2020; Orben, Przybylski, Blakemore, & Kievit, 2022). Other important factors include the widening income inequality and financial stress within households (Knapp, 2012; Patel et al., 2018), the intensified academic pressure for CYP (Högberg, 2021), and the disruption brought about by the COVID-19 pandemic, which amplified all the other pressures that CYP were already facing (Saunders, Buckman, Fonagy, & Fancourt, 2022). In addition, it is suggested that the recent mental health awareness efforts (e.g., campaigns to destigmatise mental illnesses promoted on television, radio and online; interventions and mental health awareness trainings within schools and workplaces; Collishaw & Sellers, 2020; Sampogna et al., 2017; Wagner et al., 2016; Werner-Seidler, Perry, Caelear, Newby, & Christensen, 2017) are contributing to the reported increase in mental health problems among CYP (prevalence inflation hypothesis; Foulkes & Andrews, 2023). In fact, if on one hand destigmatising campaigns are facilitating public discussions around mental illness and are leading to better detection and reporting of previously unrecognised symptoms and need for care, on the other hand they might have led to misinformation and confusion about mental illness, facilitating a tendency to label all kinds of normal negative emotions and experiences as mental disorders, or as problems that need to be urgently fixed (Foulkes, 2022; Foulkes & Andrews, 2023). In turn, this might have resulted in a sort of induced distress via a form of contagion that might not, in fact, need care (Foulkes, 2022).

Mental ill-health often has an early onset and long-lasting, pervasive, negative consequences. In a systematic review and meta-analysis of 192 epidemiological studies, comprising 708,561 participants, it was found that, among individuals with mental illness, the onset of the first mental disorder occurred before age 14, 18, and 25 years in 34.6%, 48.4%, and 62.5% of individuals, respectively (Solmi et al., 2022). The peak and median age at onset for any mental disorder was found to be, respectively, 14.5 years and 18 years (Solmi et al., 2022). Unless treated effectively, mental illness is a major cause of premature death among the adult

population. Indeed, people suffering from mental ill-health die 15 to 20 years earlier than the general population, primarily from physical illness (Firth et al., 2019) and, less commonly, suicide, which is more prevalent among those with mental illness than in the general population (e.g., Evans, Hawton, & Rodham, 2004). Mental illness is also associated with long-term negative impacts in multiple domains of children's, adolescents', and their families' lives. These include children and adolescents' mental and physical health (Canals, Domènech-Llaberia, Fernández-Ballart, & Martí-Henneberg, 2002; Chen et al., 2006; McCloughen, Foster, Huws-Thomas, & Delgado, 2012; Pan, Sun, Okereke, Rexrode, & Hu, 2011), their social functioning (Chen et al., 2006), educational attainment (Doran & Kinchin, 2017; Mojtabai et al., 2015), employment (Doran & Kinchin, 2017), and overall quality of life and life satisfaction (Chen et al., 2006; Doran & Kinchin, 2017; Vázquez, Rahona, Gomez, Caballero, & Hervás, 2015; Weitkamp, Daniels, Romer, & Wiegand-Grefe, 2013).

Mental illness represents a burden for individuals and societies. It is estimated to account for at least 45% of the overall disease burden (as measured by disability-adjusted life-years) in those aged 10 to 24 years (McGorry et al., 2024), and was confirmed by the 2019 Global Burden of Disease study to be among the leading causes of disability in this age group globally, across all income groupings (Abbafati et al., 2020; Castelpietra et al., 2022). Considering its negative impact on healthcare system costs, individuals' productivity, wellbeing and quality of life, and premature mortality, poor mental health in CYP is also associated with a high economic burden for societies (Doran & Kinchin, 2017). Indeed, the global direct (also referred to as visible costs, associated with diagnosis and treatment in the healthcare system, including medication, physician visits, psychotherapy sessions, hospitalization) and indirect (also known as invisible costs, associated with income losses due to mortality, disability, and care seeking, including lost production due to work absence or early retirement) economic cost of mental disorders across all age groups in 2010 was estimated to range between US\$2.5 trillion and US\$8.5 trillion, with this cost expected to double by 2030 (Bloom et al., 2012; Trautmann, Rehm, & Wittchen, 2016).

Despite this compelling evidence of need, the importance of mental health among CYP as an individual and public health issue is not reflected in the resources allocated by governments (Kieling et al., 2011), with only 2% of global health budgets currently invested to addressing it (McGorry et al., 2024). Generally, mental health care receives limited research investment and political support in comparison with other non-communicable diseases (such as cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes; Trautmann et al., 2016). It is suggested that this neglect of youth mental health can be partly ascribed to the generalised stigma-based neglect of mental health worldwide (Thornicroft et al., 2022), which remains a widespread problem despite the extensive campaigns to destigmatise mental illness and the efforts to improve public understanding about mental health problems that have increasingly occurred in the Western world in the last 20 years (Foulkes, 2022; Foulkes & Andrews, 2023). For example, in a recent systematic review examining the reasons why adolescents aged 10 to 19 years globally are reluctant to seek help for mental health problems, it was found that the number one reported reason was stigma (Aguirre Velasco, Cruz, Billings, Jimenez, & Rowe, 2020), defined as the fear of facing social judgement or shame, which leads to hiding or avoiding certain actions or behaviours, including mental health problems (Bharadwaj, Pai, & Suziedelyte, 2017). This neglect of CYP mental health is amplified by a more general trend, emerged over the past two decades, characterised by little support and attention towards young people, their needs and their future (to this regard we can consider, for example, the increasingly unsafe digital world, the lack of effective action on climate change, the limited access to affordable housing and the uncertain job prospects; e.g., Filia et al., 2023; General, 2023; Teo et al., 2024). Importantly, in many low- and middle-income countries, these large-scale trends may be overshadowed by more urgent survival challenges, such as war, conflict, extreme poverty, and a lack of food security and shelter, all of which substantially impact both physical and mental health (McGorry et al., 2024).

An additional, but related, issue concerns the fact that, even in high-resource settings, only a small minority of CYP in need currently accesses adequate mental health care (Gandhi,

OGradey-Lee, Jones, & Hudson, 2022; McGorry et al., 2024). This suggests that the figures of increased mental ill-health among young people may be only the tip of the iceberg of a much larger problem. In low- and middle-resource settings, mental health services for young people are severely lacking in both availability and accessibility (Zhou et al., 2020). These areas tend to have low rates of recognition and treatment of mental disorders (Thorncroft et al., 2017), as well as limited data on their prevalence (Erskine et al., 2017). In England, reports indicate that mental health services are struggling to manage the rising demand for care and provide timely treatment, resulting in long waits and high thresholds for treatment, and a consequent higher risk for the development of more severe and chronic problems (British Medical Association, 2024; National Audit Office, 2023). In addition to the insufficiency of resources to meet the increased demand, systemic obstacles have been identified in the access to the National Health Service (NHS). A recent analysis of over 71,000 children's health records in England showed that, despite their high levels of need, vulnerable children (e.g., from deprived areas, with social services involvement for current concerns) face unequal access to Child and Adolescent Mental Health Services (CAMHS; Mannes et al., August 2024). Specifically, compared to their more advantaged peers, children on child protection plans were found to be approximately twice as likely to be rejected by NHS mental health services, while children with other general social work involvement were found to be over three times as likely to be denied help (Mannes et al., August 2024).

In this section, I have attempted to outline and provide context to an alarming health and social phenomenon, referred to as a *youth mental health crisis* (Office of the Surgeon General, 2021), which is currently undermining the lives and futures of young people and their families, as well as burdening communities, societies, and economies at a global level. This complex phenomenon warrants urgent action. Key areas with universal relevance across all resource settings have been identified, with a particular emphasis on the importance of prevention programmes (McGorry et al., 2024).

## 1.2 Investing in Prevention as a Possible Solution

Prevention in mental health aims to reduce the incidence, prevalence, and recurrence of mental disorders and their associated disability (Arango et al., 2018). Effective prevention of youth mental ill-health is possible and should be a priority to address the current youth mental health crisis, its multifaceted consequences, and the burden that mental illness poses over the life course on individuals, societies, and health-care systems. It is indeed identified as one of the best investments in health and social policy reform (Doyle, Harmon, Heckman, & Tremblay, 2009; McGorry et al., 2024).

When examining mental ill-health prevention programmes, it is important to distinguish between universal, selective, and indicated prevention (Haggerty & Mrazek, 1994). Universal preventive interventions are *untargeted*, used with the general public or whole populations that have not been identified on the basis of any specific risk factors for a mental disorder. Selective preventive interventions target individuals or subgroups of the population known to be at risk of developing the target mental disorder. Indicated preventive interventions are targeted at those at high risk of a mental disorder, who are identified as having minimal but detectable signs or symptoms (Haggerty & Mrazek, 1994).

Evidence regarding the potential benefits and limitations of these three types of prevention approaches are mixed. A systematic review and meta-analysis of 146 randomised controlled trials ( $n = 46,072$  participants) showed the potential value of universal, selective, and indicated preventive interventions for emotional disorders (i.e., depression and anxiety outcomes); all interventions were found to reduce the risk of disorder onset and symptom severity up to nine months post intervention in children and adolescents (5-18 years; universal [relative risk = 0.47, 95% CI 0.37-0.60], selective [relative risk = 0.61, 95% CI 0.43-0.85], indicated [relative risk = 0.48, 95% CI 0.29-0.78]; Stockings et al., 2016). Interventions containing a psychological component, such as cognitive behavioural therapy (alone or in combination with educational materials), were found to be more effective than other

intervention types (e.g., educational-only or physical-only interventions, comprising either information provision, for example pamphlets, or physical-based exercises, for example team sports; Stockings et al., 2016). Universal prevention initiatives directed at adolescents and young adults and focused on promoting resilience and physical exercise and preventing substance use, bullying, self-harm, and suicide have also proved useful, contributing to improved mental health among these populations (Arango et al., 2018; Fusar-Poli et al., 2021). Evidence from a meta-analysis of 295 studies (n = 447,206 individuals) indicates that both universal and selective preventive interventions can improve interpersonal violence, general psychological distress, alcohol use, anxiety features, affective symptoms, and emotional and behavioural problems among adolescents and young adults (De Pablo et al., 2021). However, in a randomised controlled trial of secondary school children attending 84 schools in the UK, no evidence for superiority of universal prevention compared with teaching as usual was found in the effectiveness of a school-based mindfulness training programme to promote child mental health and wellbeing (Kuyken et al., 2022). Some evidence suggests that universal prevention may have limited effectiveness in reducing clinical levels of symptoms among those who are at risk (Lawrence, Rooke, & Creswell, 2017; Stallard et al., 2014). For example, in a large UK study of school-based universal prevention to reduce anxiety symptoms in children, it was found that children who had *low* levels of anxiety symptoms at baseline registered significantly greater reductions in symptoms following an intervention delivered by health professionals, compared to those who received the intervention from school staff or received usual school provision; however, no significant improvement for those who had *high* anxiety levels at baseline and who might be considered to be at greatest risk of developing a disorder emerged (Stallard et al., 2014). In contrast, selective and indicated prevention have been recognised as particularly promising and effective, especially if focused on combinations of risk factors for specific mental disorders, and on the identification of highly vulnerable groups (Cuijpers, Smit, & Furukawa, 2021; Lawrence et al., 2017). For example, in relation to indicated prevention, meta-analytic evidence of randomised controlled trials supports the efficacy of cognitive behavioural

interventions in preventing or delaying the onset of psychotic disorders in individuals at ultra-high risk of psychosis (Mei et al., 2021).

Preventive interventions for young people's mental health are valuable also from an economic point of view. For example, economic evaluations of psychological interventions targeting high-risk populations (e.g., children with inhibited temperament or children whose parents have a mental illness) to prevent child anxiety disorders support the potential cost-effectiveness of youth-focused psychological intervention, parent-focused psychological intervention, and parent-focused psychoeducation (Mihalopoulos et al., 2015; Simon, Dirksen, & Bögels, 2013). Considering the burden posed by youth mental ill-health on individuals and societies, and the economic case for mental disorder prevention among young people, it becomes clear that investment in prevention is also a political imperative, and that good youth mental health should be considered a national resource to support productivity (Arango et al., 2018; McGorry et al., 2024).

Despite the evidence supporting the efficacy and cost-effectiveness of prevention, it is estimated that less than 5% of mental health research funding goes on prevention research, and the translation of cost-effective preventive interventions for CYP mental health into public health initiatives and clinical practice is limited (Arango et al., 2018). Hence, investment in prevention for youth mental ill-health should represent a priority for policy makers, governments, and communities globally (McDaid et al., 2022; McGorry et al., 2024; Wykes et al., 2015).

Targeted preventive interventions (term used to refer to selective and indicated prevention) are based on modifying risk exposure and strengthening individuals' coping mechanisms (World Health Organization, 2004). Consequently, to develop and implement effective targeted prevention strategies, it is crucial to identify risk factors for CYP mental ill-health (Arango et al., 2018; Lawrence, Harvey, Williams, & Creswell, 2020b). Furthermore, during a lifespan, there are sensitive periods when risk and protective factors could increase or decrease vulnerability to mental illness and have long-lasting consequences (Arango et al.,

2018; Michael et al., 2024). These intervals, which largely overlap with periods of major developmental brain changes and are crucial for the development of secure attachment, basic schemas related to self, others, and the world, the regulation of physiological and behavioural responses, and the adult personality, include the prenatal period, childhood, and adolescence through early adulthood (Arango et al., 2018). Thus, compared to universal prevention, targeted prevention strategies within these sensitive developmental stages are suggested to be more cost-effective in the short- and long-term (Arango et al., 2018; McGorry et al., 2024).

Importantly, a substantial body of theoretical and empirical literature consistently indicates that parental mental illness represents a key, modifiable, risk factor for child mental ill-health (Arango et al., 2018; Rasic, Hajek, Alda, & Uher, 2014; Reupert et al., 2022).

### **1.3 The importance of Parents for Child Mental Health and the Risk Posed by Parental Mental Illness**

Parents have a crucial influence on the development of their children, and the mental health of children is intimately related to the mental health of their parents (Campbell et al., 2021; Jami, Hammerschlag, Bartels, & Middeldorp, 2021). Several theoretical frameworks highlight that parents can create either a risk-prone or protective environment for their children's mental health, influencing child development in complex ways. For example, the *process model of parenting* proposed by Belsky (1984) illustrates how parental characteristics, including mental health, directly affect parenting quality and, in turn, child outcomes. Specifically, parental mental ill-health may limit the emotional availability of the parent, increasing the risk of mental ill-health in children, whereas good parental mental health can buffer stress, fostering positive parent-child interactions and supporting children's healthy development (Belsky, 1984). Similarly, in the *parenting stress model* proposed by Abidin (1992), it is suggested that high levels of parental stress or parental mental illness can disrupt parenting practices, hindering a parent's ability to respond sensitively to their child's needs and

potentially leading to maladaptive outcomes in the child. Conversely, low parental stress and positive coping resources can enhance the quality of parent-child interactions, promoting child resilience and mental health (Abidin, 1992).

Numerous studies demonstrate the importance of the quality of caregiving and early parent-infant attachment relationships for children's socioemotional development (e.g., Groh et al., 2014; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012). Particularly, positive aspects of caregiving, including parental sensitivity and responsiveness to children's cues, needs and signals, promote better child developmental outcomes, including attachment security (De Wolff & Van IJzendoorn, 1997; Lucassen et al., 2011), language acquisition (Madigan et al., 2019; Rodrigues et al., 2021), executive functioning skills (Rodrigues et al., 2021), academic achievement (Raby, Roisman, Fraley, & Simpson, 2015), social functioning (Raby et al., 2015), and physiological regulation of stress (Hostinar, Sullivan, & Gunnar, 2014). In contrast, insensitive parenting is linked to an increased risk of developing emotional and behavioural problems in childhood (e.g., Cooke et al., 2022; Kok et al., 2013; van der Voort et al., 2014; Windhorst et al., 2015). Importantly, parenting behaviours remain associated with child mental health outcomes even after accounting for genetic relatedness, as demonstrated in a recent systematic review of genetically informative literature (i.e., designs that explicitly model or control for potential genetic effects in parent-offspring correlations; Jami et al., 2021). For example, negative parenting behaviours, such as over-reactive parenting, harsh parenting and parental criticism, were found to be associated with offspring emotional and behavioural problems after controlling for genetic factors (Jami et al., 2021).

Parental mental illness, and its potential to disrupt a parent's ability to read their child's needs appropriately and respond in sensitive and consistent ways, is important to consider for mental illness and impairment in offspring (e.g., Achtergarde, Postert, Wessing, Romer, & Müller, 2015; Reupert et al., 2022). It is estimated that 36% of children attending child mental health services have a parent with a mental illness (Campbell et al., 2021), and, from a related perspective, 36% of patients attending adult mental health services have children under 18

years of age (Ruud et al., 2019). A substantial body of literature demonstrates that parental mental illness is associated with an increased risk of negative outcomes in their offspring (e.g., McLaughlin et al., 2012; Reupert et al., 2022). Children whose parents have a mental illness, compared to children whose parents have no history of psychiatric disorders, are two to 13 times more likely to develop a mental illness themselves (Dean et al., 2010), with research identifying parent mental illness as a robust, although non-specific, predictor of offspring mental illness, associated with a substantial proportion of psychopathological symptoms across numerous disorder classes (Campbell et al., 2021; Dean et al., 2010; McLaughlin et al., 2012). Indeed, while there is some evidence of concordance between parent and child diagnoses (e.g., Lawrence, Murayama, & Creswell, 2019a; Scourfield & McGuffin, 1999; Van Santvoort et al., 2015), the dominant perspective is that having a parent with a mental illness is associated with an increased lifetime risk of mental illness for their child across the spectrum of diagnosable disorders (Campbell et al., 2021; Dean et al., 2010; Reupert, J Maybery, & Kowalenko, 2013), in line with the theoretical principle of multifinality in developmental psychopathology (Cicchetti & Rogosch, 1996). Furthermore, mental illness often co-occurs in mothers and fathers, potentially reflecting the impact of living with a partner with a mental illness and the influences of assortative mating, which refers to tendency for individuals with similar phenotypes, including psychiatric disorders, to mate more frequently than expected by chance (Aktar et al., 2019a; Chhabra, McDermott, & Li, 2020; Mathews & Reus, 2001). In turn, the presence of mental illness in both parents may multiply the risk of transmitting mental illness to offspring via genetic as well as environmental pathways (Goodman, 2004; Paulson & Bazemore, 2010; Teixeira, Figueiredo, Conde, Pacheco, & Costa, 2009).

Importantly, findings of a meta-analysis of 13 randomised controlled trials including 1,490 children indicate that preventive interventions targeting parents with mental illness could reduce the risk of mental illness and psychopathological symptoms in their children by 40% (combined relative risk = 0.60, 95% CI [0.45, 0.79]; Siegenthaler, Munder, & Egger, 2012), suggesting that successful management of parental psychopathology and preventive

interventions targeting at-risk groups could improve mental health outcomes in children (Arango et al., 2018).

As a note, in this thesis I focus on traditional, heteronormative family structures, specifically examining the risk posed by mothers and fathers to their children's mental health. Although other family configurations, such as those involving same-gender parents or extended family caregivers, are important areas of study, they are beyond the scope of this work.

Different potential pathways are involved in the transmission of risk for mental illness from parents to children.

### **1.3.1 Genetic and Environmental Pathways**

Theoretical frameworks highlight two main pathways via which the vulnerability to mental illness can be transmitted from parents to their offspring, namely the inheritance of genetic risk factors and the exposure to environmental stressors within the family context (e.g., Campbell et al., 2021; Jami et al., 2021). Moreover, conceptual models of intergenerational transmission of mental illness recognise the complex interplay between experientially and genetically mediated risk transmission as biological parents provide both - they pass on their genes and create the rearing environments for their children (e.g., Jami et al., 2021; Rutter, Moffitt, & Caspi, 2006).

As a child shares 50% of their genes with each biological parent and considering that many traits, including mental health issues, are heritable, any parent-offspring association could be, at least partly, due to shared genes - reflecting a genetic transmission pathway (Jami et al., 2021). Traditional twin studies, which are widely used to disentangle the relative contributions of genes and environmental factors underlying human traits, compare the trait resemblance between monozygotic (genetically identical) and dizygotic (fraternal) twins, who share approximately 50% of their segregating genes on average. These studies indicate that most mental health traits are moderately heritable, with genetic factors accounting for 20% to 80% of observed variance in mental health and related traits (Campbell et al., 2021; Craske et al., 2017; Polderman et al., 2015). Studies using prenatal cross-fostering designs, where

pregnant mothers are either related or genetically unrelated to their child as a result of in vitro fertilisation, have also been used to disentangle maternally inherited and environmental influences on child outcomes (Rice et al., 2009; Rice et al., 2010). For example, maternal prenatal stress was found to be significantly associated with child anxiety and child antisocial behaviour in both genetically related and unrelated mother-child dyads, illustrating the importance of environmental influences; in contrast, the link between prenatal stress and offspring attention deficit hyperactivity disorder was only present in genetically related mother-offspring pairs, thus potentially attributable to genetic factors (Rice et al., 2010). Broadly, genetically informative designs indicate that genes can only partially account for intergenerational risk transmission, highlighting the importance of environmental stressors.

Developmental theories suggest that the rearing environment provided by parents pre- and postnatally, including parental traits and behaviours, and parenting styles, has a key impact on offspring emotional development and social competence, for instance via *parental emotion socialisation* (Eisenberg, 2020; Eisenberg, Cumberland, & Spinrad, 1998) and *social learning* processes (Bandura & Walters, 1977; Grusec, 1994; Olsson & Phelps, 2007; Patterson, 2002). According to these models, the ways in which parents respond to their children's emotional expressions, the extent and type of emotional expressions by parents, and the frequency in which parents engage in (dys)functional discussions and communications about emotions serve as a model for children, shaping their understanding, regulation, and expression of emotions, as well as their social behaviours and the cognitive-affective representations of the self and others (Eisenberg, 2020; Eisenberg et al., 1998; Grusec, 1994). For example, dismissive or punitive parental reactions to the child's expression of emotion may shape the child's responses by inducing anxiety, fear, or anger in the child, and, in turn, increase the likelihood to develop emotional difficulties (Eisenberg et al., 1998). Further, children may learn pathological patterns of behaviour, dysfunctional emotional responses, or poor coping mechanisms by observing and imitating their parents' negative behaviour patterns, who serve as primary role models (Bandura & Walters, 1977; Patterson, 2002). Another influential theoretical framework,

*attachment theory*, proposes that newborns are biologically predisposed to develop a strong connection with their primary caregivers for their survival (Bowlby, 1972). During this crucial period, it is essential for parents to respond promptly and appropriately to the infants' emotional cues in daily interactions to foster a secure child-parent attachment in early life (De Wolff & Van IJzendoorn, 1997; Lucassen et al., 2011). It is suggested that early attachment with caregivers shapes infants' internal working models (e.g., perceptions of the self as worthy of care and love, others as trustworthy), and because attachment patterns show moderate stability from infancy to early adulthood (Chris Fraley, 2002), infants' secure attachment in their early relationships with parents provides the ground for later positive attachment behaviour in personal relationships, and protects against the development of mental illness (Aktar et al., 2019a; Chris Fraley, 2002; Lucassen et al., 2011). Conversely, children with insecure attachment patterns tend to internalise maladaptive internal working models of the self, others, and world based on the unreliable and inconsistent responses of their caregivers in the early interactions, which in turn are thought to contribute to the development of emotional and behavioural problems later in life (Cooke et al., 2022; Fearon, Groh, Bakermans-Kranenburg, van IJzendoorn, & Roisman, 2016). Indeed, parental mental illness alters parenting behaviours in daily interactions with their children. For instance, depressed and anxious mothers tend to be less responsive and/or less sensitive to child signals and needs during early interactions, compared to mothers without depression or anxiety (e.g., Bernard, Nissim, Vaccaro, Harris, & Lindhiem, 2018; Ierardi, Ferro, Trovato, Tambelli, & Riva Crugnola, 2019; Milgrom, Westley, & Gemmill, 2004; Paulson, Dauber, & Leiferman, 2006).

Crucially, genetic and environmental risk factors are not independent to one another, but are correlated and can interact to influence both the vulnerability to mental illnesses and the manifestation of emotional and behavioural problems in unique and complex ways (Jami et al., 2021; Rutter et al., 2006). The gene-environment correlation can be passive, evocative, or active (Rutter et al., 2006; Scarr & McCartney, 1983). Passive gene-environment correlation refers to the instances in which parents provide rearing environments that are influenced by genes they share

with their children. For example, parents genetically predisposed toward substance misuse not only pass that genetic risk onto their children, but may also create an environment where substances are more available within the home, and normalise substance use (Wilson & Rea-Sandin, 2024).

Evocative gene-environment correlation occurs when children evoke responses from their environments due to their own genetically influenced traits. For instance, an adolescent with a genetic predisposition for impulsivity and disruptive behaviour who defies parental rules or causes disruptions in class may elicit responses from family members, teachers, and peers that reinforce and further shape their disruptive behaviour (Wilson & Rea-Sandin, 2024). Active gene-environment correlation occurs when children actively seek out or engage in environments that align with their genetic predispositions and interests; as they gain more autonomy with age, these processes are likely to become more influential in shaping their experiences. As an example, adolescents with a genetic liability for disordered eating behaviours may engage with pro-anorexia social media groups or online communities that promote extreme thinness, reinforcing and worsening their eating disorders (Wilson & Rea-Sandin, 2024). Importantly, these processes emphasise the bidirectional relationship between genes and environments, with individuals shaping their experiences based on their inherited traits (Kendler & Baker, 2007).

Similarly to gene-environment correlations, gene-environment interactions reflect the variation in genetic influences as a function of the environment, with an array of theories proposing ways in which individuals' genetic predisposition can influence development depending on whether they are exposed to risky or supportive environments (Wilson & Rea-Sandin, 2024). The *diathesis-stress* (Sroufe, 1997; Zuckerman & Riskind, 2000) and *vulnerability-stress* (Ingram & Luxton, 2005) models, for instance, theorise that some individuals are biologically more vulnerable to risk-promoting environmental contexts and environmental stressors, such as harsh parenting or adverse life events (Monroe & Simons, 1991), and that specific environments may trigger genetic predispositions, resulting in negative outcomes such as the development of mental illness. Falling broadly under the diathesis-stress model, the *foetal programming hypothesis*, also known as the *Barker hypothesis* or the *developmental origins of health and disease hypothesis*

(Barker, 1998; Barker, 2007; O'Donnell & Meaney, 2017), proposes that early life experiences, starting from the prenatal period, have widespread implications for future health and development. In particular, maternal poor mental health and elevated stress during pregnancy can lead to modifications in foetal stress biology (such as a dysregulation in the hypothalamic-pituitary-adrenal pathways and serotonin transmission) which, in turn, can adversely affect later development (e.g., Glover, O'Connor, & O'Donnell, 2010; Howland, Sandman, & Glynn, 2017; Oberlander et al., 2008). Indeed, as suggested by Glover (2011) and Sandman, Glynn, and Davis (2013), foetal adaptations are aimed at promoting survival, with exposure to maternal prenatal stress serving as a signal that prepares the foetus for characteristics of the postnatal environment through biological changes. The developmental outcomes are influenced by how well the in-utero signals align with the actual postnatal environment. From an evolutionary standpoint, behaviours that may have been beneficial when programmed in utero might not align with the demands of the postnatal environment, and pathology can emerge from the mismatch between the pre- and postnatal environments (Monk, Lugo-Candelas, & Trumpff, 2019).

In this thesis I focus primarily on the environmental pathway of risk transmission, but it is important to note that gene-environment correlations and interactions can be a source of bias (known as genetic confounding) if not accounted for when looking at the association between parental factors and offspring outcomes (Jami et al., 2021).

### **1.4 The Specific Impact of Parental Anxiety on Child Mental Health**

Up to this point, I have delineated the concerning high rates of mental ill-health among CYP worldwide and emphasised the potential benefits of addressing modifiable risk factors, primarily parental mental illness, to prevent further increases in the rates and limit the overall disease burden on individuals and societies. Going forward, I will focus specifically on parental anxiety, its subsequent impact on children's mental health, and strategies to support the mental health of children with anxious parents. This choice is justified by the fact that, among all the psychiatric conditions in the general population worldwide, anxiety disorders are the

most common, with a lifetime prevalence of approximately 13% to 16% (Kessler et al., 2009; Steel et al., 2014) and an estimated 301 million people living with an anxiety-related problem (Our World in Data, 2019). Moreover, more recent evidence shows that rates of anxiety disorders have increased since the outbreak of the coronavirus pandemic (Brunier & Drysdale, 2020; Rogers et al., 2020b), with a prevalence of 27.3% (95% CI [23.7%, 31.2%]) among the general population worldwide reported in a recent meta-analysis (Kan et al., 2021).

### **1.4.1 The Burden of Anxiety Disorders**

Anxiety disorders are characterised by intense and prolonged fear and emotional distress, with associated cognitive and physical symptoms, that cause significant interference in day-to-day functioning and can manifest in a range of different situations and towards different objects (American Psychiatric Association, 2013). The current edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) classifies anxiety disorders into: separation anxiety disorder, selective mutism, specific phobia, social anxiety disorder, panic disorder, agoraphobia, generalized anxiety disorder, substance/medication-induced anxiety disorder, anxiety disorder due to another medical condition, and other specified anxiety disorder.

Overall, anxiety disorders typically have an early onset, with meta-analytic evidence showing that nearly 40% of people with an anxiety disorder experience onset before age 14 (Solmi et al., 2022), and, if left untreated, follow a chronic course, negatively impacting multiple life domains (Cabral & Patel, 2020; Lawrence, 2018), such as educational attainment, interpersonal relationships, mental and physical health, and social functioning (Lawrence, 2018; Mychailyszyn, Méndez, & Kendall, 2010; Pollard et al., 2023; Xiong, Liu, Liu, & Hall, 2022). Moreover, anxiety disorders can contribute to long-lasting disadvantages across the lifespan, including lowered economic status and impaired interpersonal relationships (Mendlowicz & Stein, 2000; Pollard et al., 2023).

In light of their chronic course, negative educational, health and social sequelae, and costs for healthcare systems and societies, anxiety disorders are a significant public health concern (Xiong et al., 2022; Yang et al., 2021). In 2010, anxiety disorders were reported to be the sixth most common

cause of disability globally in terms of years of life lived with disability, in both high-income and low- and middle-income countries, accounting for more disability than severe mental disorders such as schizophrenia (ranked 18th at global level), and other chronic conditions such as diabetes (globally ranked ninth; Baxter, Vos, Scott, Ferrari, & Whiteford, 2014). In 2019, anxiety disorders were indicated as the second leading mental health-related cause of disability-adjusted life-years and years lived with disability globally (Vos et al., 2020). Anxiety disorders are also associated with significant societal costs; in England, these costs are predicted to reach £14.2 billion by 2026 (McCrone, Dhanasiri, Patel, Knapp, & Lawton-Smith, 2008), although this is likely an underestimate, given that this prediction did not account for the increased prevalence since the COVID-19 pandemic. In a recent systematic review and meta-analysis, it was estimated that the total annual direct and indirect societal costs per clinically anxious child are up to £4,040 (Pollard et al., 2023), which are lower than the costs associated with autism spectrum disorder (£8,110 annually in young children; Buescher, Cidav, Knapp, & Mandell, 2014), but considerably higher than those associated with clinical depression in young people (£1,960 annually; Bodden, van den Heuvel, Engels, & Dirksen, 2022).

### **1.4.2 Anxiety in Parents and Outcomes in Their Offspring**

Anxiety disorders are particularly common among new parents (Dennis, Falah-Hassani, & Shiri, 2017; Leiferman et al., 2021). Indeed, the transition to parenthood represents a major life event and, as such, the perinatal period (which spans conception through pregnancy, birth, and the first postnatal year; National Collaborating Centre for Mental Health, 2007) may be potentially stressful for many parents (Figueiredo et al., 2008; Keeton, Perry-Jenkins, & Sayer, 2008), with a consequent exacerbation or onset of mental health problems (Challacombe et al., 2023). It is estimated that 17.55% of mothers and 10.67% of fathers experience clinical levels of anxiety in the perinatal period (Leiferman et al., 2021), which is a considerably higher proportion than the global prevalence rates for anxiety disorders in women and men generally, estimated to be 5.7% and 3.4% respectively (IHME, 2024).

Crucially, parental anxiety can negatively affect parenting style and caregiving quality, including parental sensitivity and responsiveness, thus hindering parent-child interactions (Ierardi et al., 2019; Parfitt, Pike, & Ayers, 2013). In turn, this negative impact of anxiety disorders on parenting and early parent-child relationships can increase the likelihood of the development of emotional and behavioural difficulties among offspring (Barker, Jaffee, Uher, & Maughan, 2011; O'Connor, Heron, Glover, & Team, 2002). For example, particular parenting practices that increase children's sense of threat or limit their opportunities to tackle challenges, and thus develop a sense of mastery over the environment, have been found to be particularly common among parents with anxiety disorders (Murray, Creswell, & Cooper, 2009). Further, parental postnatal anxiety symptoms and disorders, compared to their absence, have been associated with negative and disengaged parenting (Bögels & Brechman-Toussaint, 2006; McLeod, Wood, & Weisz, 2007; Williams, Kertz, Schrock, & Woodruff-Borden, 2012), less challenging parenting behaviour and more overinvolvement (Möller, Majdandžić, & Bögels, 2015). These parenting behaviours can increase the risk of emotional and behavioural difficulties in children (Barker et al., 2011; Joussemet et al., 2008); however, it should be noted that meta-analytic evidence indicates that parental behaviours, at a broad level, play a significant, but small-in-magnitude, role in the development of child poor mental health (McLeod et al., 2007; Möller, Nikolic, Majdandzic, & Bögels, 2016), accounting for only approximately 4% to 6% of the variance in childhood emotional and behavioural problems (McLeod et al., 2007; Rothbaum & Weisz, 1994).

Adverse effects for child outcomes have also been found when anxiety symptoms or disorders in parents were captured prenatally. For example, in a longitudinal study using the Avon Longitudinal Study of Parents and Children (ALSPAC) cohort, O'Connor et al. (2002) found that maternal anxiety in late pregnancy was associated with child behavioural and emotional problems at age 4 (odds ratio [OR] = 1.72, 95% CI [1.14, 2.59]) after adjusting for covariates (i.e., smoking, alcohol use, birth weight for gestational age, maternal age, child sex, and socioeconomic status) and independently from maternal prenatal and postnatal clinical levels

of depression. In a more recent study including two cohorts (Generation R and ALSPAC), Van Batenburg-Eddes et al. (2013) found that maternal antenatal anxiety was associated with an increased risk of child attention problems at age 3 (Generation R) and 4 (ALSPAC) after accounting for confounders (i.e., child age, gender and ethnicity; maternal age, educational level, smoking and alcohol use during pregnancy; family income; Generation R: OR = 1.24, 95% CI [1.06, 1.46]; ALSPAC: OR = 1.32, 95% CI [1.19, 1.47]). Notably, neither study controlled for genetic risk.

At a more general level, several meta-analyses have demonstrated that the children of parents with anxiety disorders are at increased risk of developing mental health problems. In a meta-analysis of 13 studies, including nearly 1,900 children, and examining the rates of anxiety and depression among children and adolescents with clinically anxious parents, Micco et al. (2009) concluded that children of parents with anxiety disorders have an odds ratio of 3.91 (95% CI [2.51, 6.10]) of developing an anxiety disorder compared with children of non-psychiatric controls, and an odds ratio of 1.84 (95% CI [1.26, 2.67]) of having an anxiety disorder compared with children of psychiatric controls. Moreover, the authors found that children of parents with anxiety also have an increased risk of having depressive disorders compared to children of parents without psychiatric conditions (odds ratio = 2.67, 95% CI [1.69, 4.23]), suggesting that parental anxiety disorders confer significant risk for both anxiety and depression among children (Micco et al., 2009). These findings were confirmed and extended by a more recent meta-analysis of 25 studies and 7,285 offspring conducted by Lawrence et al. (2019a), where it was shown that, compared with children whose parents do not have an anxiety disorder, children of parents with anxiety disorders are at increased risk of anxiety disorders (risk ratio = 1.76, 95% CI [1.58, 1.96]) and depressive disorders (risk ratio = 1.31, 95% CI [1.13, 1.52]), even if the effect sizes obtained were smaller than those reported in Micco et al. (2009). The findings from a meta-analysis by Ahmadzadeh et al. (2021) of genetically informed research designs, which control for participant biological relatedness, suggest that postnatal anxiety exposure, but not prenatal exposure, may be causally associated with concurrent offspring emotional symptoms (offspring

age range = 0.75-22 years) via nongenetic mechanisms ( $r = .13$ , 95% CI [0.04, 0.21]). These results are consistent with the body of evidence supporting the centrality of environmental factors in the intergenerational transmission of psychopathology, even after taking into consideration genetic risk (Ahmadzadeh et al., 2019; Eley et al., 2015; Jami et al., 2021; Murray et al., 2009; Purves et al., 2020). Notably, the reviews discussed above only focused on the associations between parent-offspring emotional disorders and symptoms (Ahmadzadeh et al., 2021; Lawrence et al., 2019a; Micco et al., 2009), despite evidence indicating that children of anxious parents are at increased risk for both emotional and behavioural problems (Biederman, Rosenbaum, Bolduc, Faraone, & Hirshfeld, 1991; Jami et al., 2021; Silverman, Cerny, Nelles, & Burke, 1988; Turner, Beidel, & Costello, 1987).

### **1.4.3 Environmental Pathways of Risk Transmission from Anxious Parents**

A substantial body of literature suggests that anxious parents may environmentally transmit vulnerability to mental health difficulties to their children via a social learning pathway (Bandura & Walters, 1977; Grusec, 1994), specifically by the modelling of anxious behaviours or by the verbal communication of threat-relevant information, in social situations (Askew & Field, 2008; Bandura & Walters, 1977; Fisak & Grills-Tauechel, 2007; Grusec, 1994; Murray et al., 2009). Observational and experimental studies support the importance of information transfer and modelling in the intergenerational risk transmission from anxious parents to children. Specifically, experimental work shows that receiving negative verbal information can lead to increased anxious beliefs and fears in nonclinical children (e.g., Field & Lawson, 2003; Muris & Field, 2010), which can persist over time (Field, Cartwright-Hatton, Reynolds, & Creswell, 2008; Muris & Field, 2010). A particularly important role for children's socioemotional development is found when fear relevant information is communicated by parents. For example, a meta-analysis of 10 experimental studies showed that parental verbal threat information can increase children's fear reactions towards novel stimuli, even after a single exposure to these stimuli (Hedges'  $g = 1.26$ ,  $SE = 0.25$ , 95% CI [0.77, 1.75],  $p < .001$ ; Nimphy, Mitrou, Elzinga, Van der

Does, & Aktar, 2024). Risk transmission via modelling is also well supported by research. In a longitudinal study by Murray et al. (2008), it was found that compared to a non-anxious control group of mothers, mothers with a social anxiety disorder expressed more anxiety (via facial, bodily and verbal cues, such as worried or fearful expressions, tense posture, wringing hands, and rushed or agitated speech) in a social referencing task, where they engaged in a conversation with a stranger while their 10-month-old infant observed the interaction and the infant's response to the stranger was assessed. More importantly, the expressed signs of anxiety in mothers with social anxiety disorder predicted increased infant social avoidant behaviours four months later, particularly during the more stressful moments of the interaction between the infant and the stranger (i.e., when the stranger picked the infant up; Murray et al., 2008). With a similar task, Aktar, Majdandžić, De Vente, and Bögels (2013) reported that, at 12-months, parents' expressed anxiety, but not parental lifetime anxiety disorders, predicted infant avoidance during interactions with social (i.e., a stranger) and non-social (i.e., a mechanical dinosaur) novel stimuli, complementing previous studies and indicating that, at 12 months, parental expressions of anxiety in the moment via bodily, facial and verbal cues have a greater impact than their lifetime anxiety diagnoses in the social learning of fear.

It is important to acknowledge that studies employing longitudinal semi-experimental designs with clinically anxious parents do not allow for inferences to be drawn regarding causal relationships between parental expressions of anxiety and observed infant anxious responses. This is because infants of clinically anxious parents have a learning history of observing anxiety in their parents' day-to-day behaviours, thus it is not possible to disentangle the effect of infants' observations of parents' anxious behaviours in a laboratory setting from the influence of their parents' day-to-day anxious parenting (e.g., verbal information transfer, overcontrol, overprotection; see Möller et al., 2016; Murray et al., 2009). In their experimental study, de Rosnay, Cooper, Tsigaras, and Murray (2006) tested the causal effects of anxiety expressions towards strangers in *non*-anxious mothers' behaviours, which were experimentally manipulated to be either socially anxious or neutral, on their 12- to-14 month-old infants' responses to the

same strangers. The results showed that when those infants, who had no anxious learning history, observed their mothers act anxiously with the stranger, they displayed more anxious behaviours (i.e., were more fearful and avoidant) in their own interactions with the same stranger, compared to when the infants observed their mothers engaging in a neutral interaction with the stranger. In a different experiment, Thirlwall and Creswell (2010) trained a non-clinical sample of mothers to exhibit either controlling or autonomy-granting behaviours while their child prepared for a speech task. The authors found that maternal controlling behaviour during the preparation period led to increased anxiety in the child during the delivery of the speech task, compared to when mothers displayed autonomy-granting behaviours (Thirlwall & Creswell, 2010). These studies provide an initial demonstration of a potential causal, environmentally mediated, role for maternal parenting behaviours on infants' anxious responses (Thirlwall & Creswell, 2010).

### **1.4.4 Potential Moderators of the Effect of Parental Anxiety on Child Mental Health**

The literature evidences a range of variables that can play a role in the association between parental anxiety and child mental health outcomes, including the child's age, sex, temperament, and biological relatedness with the parent, familial socioeconomic and cultural context, availability and involvement of the father (e.g., Connell & Goodman, 2002; Lawrence, Waite, & Creswell, 2019b). These variables have been included as potential moderators in theoretical models for the transmission of risk from parents to children (e.g., Goodman & Gotlib, 1999; Ramchandani & Psychogiou, 2009). I will present the model proposed by Ramchandani and Psychogiou (2009) more in detail in section 1.5.2, when discussing pathways of risk transmission from fathers to children. Moreover, advancements in research methodologies and shifts in family structures have prompted the consideration of the methods used to assess parental and child mental health and the study's publication time as potential moderating factors (Connell & Goodman, 2002; Lawrence et al., 2019b).

#### 1.4.4.1 Offspring Age

The age of offspring may play a role in the parent-offspring symptom association. Consistent with the notion of sensitive developmental periods and the greater vulnerability and dependency that characterise early infancy (Arango et al., 2018; Goodman et al., 2011; Marín, 2016; Michael et al., 2024; Teicher, Samson, Anderson, & Ohashi, 2016), parental anxiety might exert a particularly strong effect on younger children, compared to older ones. Supporting this argument, the findings from the meta-analysis by Goodman et al. (2011) showed a significant moderation by child age for associations between maternal depression and child mental health difficulties, with decreasing effect sizes as studies examined older children and adolescents. However, evidence is mixed and the recent meta-analysis looking at the specific impact of parental anxiety disorders on child mental health outcomes by Lawrence et al. (2019a) did not find a significant moderating effect of child age. It remains unclear whether child age moderates the associations between parental anxiety and child emotional *and* behavioural difficulties.

Some theories propose that maternal and paternal mental health might affect children differently, with fathers potentially having a stronger influence on older children due to greater involvement at later developmental stages (Bögels & Phares, 2008; Lamb & Lewis, 2010; Möller, Majdandžić, de Vente, & Bögels, 2013). Consistent with this hypothesis, in their meta-analysis of parent-child psychopathology associations, Connell and Goodman (2002) found a contrasting pattern of age effects for mothers versus fathers. Specifically, smaller effects were found for maternal influence in samples of older children, whereas paternal influence was stronger in studies examining mental health problems in older children (adolescence), compared to younger (early and middle childhood) children (Connell & Goodman, 2002). Nevertheless, no significant effect of child age was found in the meta-analysis by Trepiaik, Trepiaik, Guérin-Marion, Kristen, and Deneault (2022) examining the association between paternal and child trait anxiety.

#### **1.4.4.2 Offspring Sex**

Male and female offspring may be differently susceptible to parental symptoms, although findings are mixed. There is some evidence that girls are more sensitive to expressions of parental affect and react more strongly than boys at maternal expressed fear and anxiety (Blackford & Walden, 1998; Gerull & Rapee, 2002). Further, Goodman et al. (2011) found maternal depression to be more strongly associated with emotional problems in girls than in boys. In contrast, some studies show that boys are more vulnerable than girls to the effects of their fathers' depression (Ramchandani, Stein, Evans, & O'Connor, 2005) and substance abuse (Loukas, Fitzgerald, Zucker, & von Eye, 2001). This may be partly explained by the fact that fathers tend to spend relatively more time with their sons than with their daughters, possibly because fathers can identify better with a child of the same sex, or because of a belief that their knowledge and skills are more suited to raising a son than raising a daughter, as Lamb and Lewis (2010) theorised. However, societal changes may influence these tendencies, and recent meta-analytic evidence shows no moderator effect of offspring sex in the association between parental anxiety and offspring emotional symptoms (Lawrence et al., 2019a; Trepiak et al., 2022).

#### **1.4.4.3 Child Temperament**

Temperament, defined in Rothbart's model as "constitutional differences in reactivity and self-regulation, with 'constitutional' seen as the relatively enduring biological makeup of the organism influenced over time by heredity, maturation, and experience" (Rothbart, 1981, p. 37), can predispose children to be more or less affected by exposure to difficulties, including parental psychopathology (Bakermans-Kranenburg & Van IJzendoorn, 2007; Belsky, Hsieh, & Crnic, 1998; Van Zeijl et al., 2007), and is modestly but consistently associated with child mental health outcomes (Rothbart & Bates, 2007). In particular, specific dimensions of child temperament may increase the risk for child subsequent psychopathology: significant associations have been found between negative reactivity and behavioural difficulties (Flouri, 2008), between behavioural inhibition and emotional problems, particularly subsequent anxiety

symptoms and disorders (Biederman et al., 2001; Flouri, 2008; Sandstrom, Uher, & Pavlova, 2020), and between negative emotionality and both emotional and behavioural difficulties (Compas, Connor-Smith, & Jaser, 2004; Rothbart & Bates, 2007). Moreover, child temperament was shown to moderate the association between parental expressed anxiety and infant avoidant behaviours in social referencing tasks (Aktar et al., 2013; de Rosnay et al., 2006; Murray et al., 2008).

Children's temperament can also affect parental behaviours and parent-child interactions. For instance, studies showed that fathers with alcohol dependency tend to consume more alcohol after interacting with a difficult child if they anticipate further interaction with the child soon (Lang, Pelham, Johnston, & Gelernter, 1989; Pelham Jr & Lang, 1999; Ramchandani & Psychogiou, 2009). Moreover, a child's difficult temperament combined with parental psychopathology may confer particularly high risk for the child due to the parent's potentially limited capacity to read and respond adequately to their child's temperamentally shaped signals and needs (Dix & Meunier, 2009; Ramchandani & Psychogiou, 2009).

#### **1.4.4.4 Biological Relatedness**

As discussed in section 1.3.1, genetic factors are likely to be at least partially accountable for the intergenerational transmission of symptoms (Ahmadzadeh et al., 2021; Eley et al., 2015). Therefore, studies that focus exclusively on biologically related parent-offspring pairs may demonstrate stronger symptom associations than studies including non-biologically related pairs (Connell & Goodman, 2002). However, it is important to note that even when genetic contributions are taken into account, a significant role for environmental factors in the transmission of mental health issues across generations has been consistently reported (e.g., Ahmadzadeh et al., 2021; Eley et al., 2015; Jami et al., 2021).

#### **1.4.4.5 Socioeconomic Status and Cultural Context**

The rearing environment, and the familial economic and social resources, are influential characteristics for the development of children (Grüning Parache, Vogel, Meigen, Kiess, & Poulain, 2024; Shaffer, 1996; Siddiqi, Hertzman, Irwin, & Hertzman, 2012). Analysing data from a

large German cohort study, Poulain et al. (2019) found that higher socioeconomic status (SES), an index obtained through combining information on parental education, occupation, and income, was associated with better health and a higher quality of life in children and adolescents. Specifically, children from higher SES backgrounds showed fewer behavioural difficulties, had healthier lifestyles, engaged in more physical activity, had better academic outcomes, and experienced fewer critical life events, compared to children from lower SES backgrounds. Moreover, in a study using the same cohort, high family income was found to be a protective factor for children's emotional wellbeing (Herrmann et al., 2018), consistent with findings from studies in other countries highlighting the importance of SES for child mental health, including the UK (e.g., Kirby, Wright, & Allgar, 2020), Australia (e.g., Goldfeld et al., 2018), and Spain (e.g., Moreno-Maldonado, Ramos, Moreno, & Rivera, 2019). Together, these findings emphasise the importance of accounting for familial SES in relation to the intergenerational transmission of psychopathology and child mental health outcomes.

Similarly, the cultural landscape in which young people grow up also influences the expression of youth mental health. The cultural context encompasses diverse factors such as religion, economic inequality, family structure and roles, cultural traditions, which can, in turn, shape beliefs and perceptions of mental health and play a role in the expression, recognition and understanding of emotions, suicide risk, help-seeking behaviours, social support, and stigma (Bornstein et al., 2023; Cauce et al., 2002; Chandler & Lalonde, 1998; Elfenbein & Ambady, 2002; McGorry et al., 2024; Misra et al., 2021; Ran et al., 2021).

#### **1.4.4.6 Father Involvement**

As proposed in the model by Goodman and Gotlib (1999) for the transmission of risk from depressed mothers to their children, the presence of healthy and involved fathers can represent a protective factor, providing a positive role model for their children, buffering the adverse effects of maternal psychopathology on the children, and supporting mothers in parenting activities. In contrast, an absent and unsupportive father can increase the risk of adverse child outcomes, negatively affecting the quality of father-child relationship, the quality of parenting,

and the practical and emotional support provided to mothers and the family unit (Goodman & Gotlib, 1999; Ramchandani & Psychogiou, 2009). However, as proposed by some authors, the *quality* of the father-child interactions may be more important than the *quantity* of time fathers spend with their children (McBride, Schoppe, & Rane, 2002) and, as outlined in the model by Lamb, Pleck, Charnov, and Levine (1985), different dimensions of paternal involvement need to be considered, including fathers' accessibility, responsibility, and engagement.

### **1.4.4.7 Assessment Method**

From a more methodological perspective, the methods used to assess parental anxiety and offspring outcomes may influence the magnitude of their associations (von Glischinski, von Brachel, Thiele, & Hirschfeld, 2021). For example, measures of trait anxiety capture characteristics that are more genetically influenced and stable across time, whereas measures of state anxiety capture aspects that are more environmentally influenced, temporal, and are likely to vary across time as a function of the situation the person encounters (Lau, Eley, & Stevenson, 2006; Schmitt & Blum, 2020). Further, clinical interviews administered by professionals have the strength of accounting for the frequency, severity and impact of symptoms, while self-report questionnaires typically capture only the frequency or severity of symptoms. Importantly, questionnaires, as compared to diagnostic interviews, provide continuous measures that capture more variance, which, in turn, translates into more statistical power to detect differences among participants (Altman & Royston, 2006). Finally, the rater of the symptoms may also play a role, with parents experiencing anxiety difficulties providing a potentially biased assessment of their own and their children's symptomatology (i.e., shared rater bias or shared method variance; Connell & Goodman, 2002; Krasikova & LeBreton, 2012).

### **1.4.4.8 Publication Year**

Study publication year may act as a potential moderator in light of the societal changes that have characterised parenthood in the last few decades, which are generally leading to an increasing involvement of fathers in childcare roles and a simultaneous growing participation of

mothers in the workforce (e.g., Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000; Feldman, 2023). I will discuss the changes in fatherhood in more detail in section 1.5.1. However, broadly, an increased presence of fathers in their children's lives may lead to a stronger influence of paternal mental health on their offspring developmental outcomes (i.e., larger effect sizes), although other explanations may also be possible (e.g., changes in how research is conducted or in the assessment methodology; Connell & Goodman, 2002). In contrast, according to the *decline effect* theorised by Ioannidis (2012), effect sizes tend to become smaller over time regardless of the phenomenon being studied, a trend that is thought to reflect an over-estimation of the effect sizes (or publication bias) in earlier studies and an improved methodological quality of more recent publications.

In summary, in this section, I have highlighted how parental anxiety may represent an important modifiable risk factor for the development of mental health problems in CYP and should be addressed in research and clinical practice, especially considering the high prevalence of anxiety disorders worldwide, particularly among parents. However, the current understanding is not without limitations and knowledge gaps, which I will outline below.

### **1.5 Limitations in the Existing Research Focused on Parental Anxiety and Child Mental Health Outcomes**

A substantial body of research has investigated the associations between parents' variables, including parental anxiety and parenting behaviours in the context of anxiety, and mental health in children (Barker, Iles, & Ramchandani, 2017; Jami et al., 2021; McLaughlin et al., 2012; Reupert et al., 2022). However, the field presents key limitations that prevent a full understanding of the influences of parental anxiety on their offspring, thus hindering the prevention efforts. First, most of the existing evidence refers to samples comprising only or mainly mothers (e.g., Lawrence et al., 2019a; Micco et al., 2009); in fact, research has traditionally neglected the role played by fathers and has not considered key aspects of

fathering when studying the impact of parental mental illness, including anxiety disorders and symptoms, for children's development (Barker et al., 2017; Fisher et al., 2021; Leach, Poyser, Cooklin, & Giallo, 2016; Ramchandani & Psychogiou, 2009). Second, it remains difficult to draw causal conclusions regarding the mechanisms involved in the transmission of vulnerability across generations, particularly in relation to the father-specific contribution in the context of paternal anxiety (Barker et al., 2017; Zhou et al., 2024). Third, there is a lack of understanding of how best to support anxious parents in preventing the development of mental ill-health among their children (Reardon, Harvey, Young, O'Brien, & Creswell, 2018).

### **1.5.1 The Neglected Role of Fathers**

Much of the conceptual framework and research presented in the earlier sections is based on mothers; indeed, the specific role of fathers in the intergenerational transmission of psychopathology is an important, yet historically under-investigated, aspect (Barker et al., 2017; Fisher et al., 2021; Leach et al., 2016; Ramchandani & Psychogiou, 2009). The small-to-moderate associations between maternal psychopathology during the perinatal and postnatal period and emotional and behavioural difficulties in offspring from infancy through adolescence are well documented (e.g., Rogers et al., 2020a; Stein et al., 2014). Studies have also shown how maternal anxiety and specific maternal variables (e.g., mother-child attachment, expressed verbal and non-verbal behaviours, such as modelling of anxiety and controlling parenting) can influence the trajectories of child development and the onset of psychopathology in their offspring (e.g., Barker et al., 2017; Barker et al., 2011; de Rosnay et al., 2006; Gerull & Rapee, 2002; Ginsburg, Drake, Tein, Teetsel, & Riddle, 2015; Murray et al., 2008; Thirlwall & Creswell, 2010). However, comparatively less attention has been paid to the significance of these variables in fathers when studying the outcomes of parental psychopathology (Barker et al., 2017; Ramchandani & Psychogiou, 2009), despite their importance in offspring development being well-documented and increasingly recognised (Barker et al., 2017; Cabrera & Tamis-LeMonda, 2013; Connell & Goodman, 2002; Feldman,

2023; Fisher et al., 2021; Kane & Garber, 2004; Lamb, 2010). A quick search on Web of Science can provide immediate evidence of this disparity: using keywords related to the impact of *maternal* anxiety on their offspring, the records returned are 10,968, while the studies found when running the same search for the impact of *paternal* anxiety are 2,577 (search conducted on 23<sup>rd</sup> September 2024; details are reported in Appendix A).

Fathers underrepresentation in developmental psychopathology research is thought to be due to practical factors, such as that mothers are easier to involve or more willing to take part in research compared to fathers (e.g., Phares & Compas, 1992), as well as more general assumptions, including that mothers spend the majority of time with their infants and thus have a greater impact on their development, and that, overall, mothers matter more than fathers (Bögels & Phares, 2008; Lamb, 2000; Lamb, 2010). Indeed, I did have first-hand experience of the challenges of involving fathers in research: one of the studies originally planned for my PhD project could not be completed within the PhD timeframe because recruitment proved particularly difficult (Zecchinato, Kreppner, Aktar, & Lawrence, 2023). See Appendix B for the peer-reviewed stage 1 registered report.

A recent systematic review identified several factors influencing father engagement within child and family services, including both the individual practitioner competencies (e.g., practitioner knowledge and attitudes towards fathers) and the service environment (e.g., targeted advertising and promotion, workplace policies that emphasise father engagement, evaluation activities, availability of resources and staff training; Baran & Sawrikar, 2024). Crucially, these aspects are important because fathers' engagement with child and family services can enhance the quality of fathering (Baran & Sawrikar, 2024; Doherty, Erickson, & LaRossa, 2006) and can be relevant when thinking about strategies to involve fathers in research.

### **1.5.1.1 Why Focusing on Fathers Is Important**

The crucial importance of shedding light on the role of fathers in their children's development is supported by a growing body of research, rapid societal changes, as well as

theoretical and empirical evidence suggesting that mothers and fathers may play distinct roles in shaping child outcomes.

Meta-analytic evidence shows small but significant effect sizes for the association of both maternal and paternal psychopathology with child emotional and behavioural difficulties (Connell & Goodman, 2002). Findings from a systematic review including 21 prospective studies indicate that paternal depression is significantly associated with child and adolescent emotional and behavioural difficulties (Sweeney & MacBeth, 2016). In a recent meta-analysis focused on the associations between father and child trait anxiety and depression, Trepia et al. (2022) found a significant positive association between both paternal and child trait anxiety ( $r = .13$ , 95% CI [.07, .18],  $k = 39$ ,  $n = 11,683$ ) and paternal and child depression ( $r = .15$ , 95% CI [.12, .17],  $k = 70$ ,  $n = 58,255$ ). However, the magnitude of the association between paternal anxiety (disorders, trait and state symptoms) and child developmental outcomes (emotional and behavioural problems) from infancy to adulthood remains unclear. Even less is known about the mental health status of fathers in the perinatal period and its impact on child outcomes. Evidence indicates that, similarly to mothers, fathers have an elevated risk of experiencing poor mental health, including depression and anxiety, in the perinatal period (Fisher et al., 2021; Leiferman et al., 2021). In a longitudinal cohort study of 901 fathers and 939 mothers, it was found that paternal perinatal stress is associated with child emotional and behavioural problems at 24 months, even after adjusting for concurrent maternal depression, anxiety and stress (Challacombe et al., 2023). The impact of a father's perinatal mental health on their children, however, is not limited to the first years of life. For example, reported depression in early fatherhood was found to predict emotional and behavioural problems at 4-5 years of age in children, also when controlling for early maternal depression and later paternal depression (Fletcher, Feeman, Garfield, & Vimpani, 2011). This highlights the importance of mental ill-health in fathers during early development. Further, paternal mental illness in the perinatal period is associated with maternal mental illness, and can negatively impact fathers' ability to support mothers (Fisher et al., 2021). These results add evidence to the timely need to

better understand the specific contribution of fathers' perinatal and postnatal mental (ill)-health, and anxiety specifically, which has received limited attention compared to paternal depression, in shaping child emotional and behavioural outcomes across the lifespan.

The sociological changes that families have undergone in recent decades provide further support to this need. Indeed, we have witnessed a reformulation in the role of the father, as indexed by a gradual update of traditional family roles, an increased presence of paternal caregiving responsibilities, and the simultaneous increased participation of mothers in the workforce (Cabrera et al., 2000; Cabrera, Volling, & Barr, 2018; Feldman, 2023; Trepiak et al., 2022). A survey conducted across the United States revealed that, since 1965, the amount of time fathers spend with their young children during both the week and weekends has tripled, with 57% of men stating that fatherhood is central to their identity (Livingston & Parker, 2019). The childrearing activities in which fathers are involved have also expanded, moving from limited interactions after work in the 1950s and 1960s to a more engaged role, where fathers now spend time alone with their children and take on the full range of childcare responsibilities (Yogman & Eppel, 2022). Another important aspect to consider in fatherhood research relates to the cultural context. The increase in father involvement has mainly been reported in more affluent societies (Feldman, 2023), and little systematic data are available from low and middle income countries that typically maintain a more traditional family structure (Bornstein et al., 2023). For example, the amount of time fathers spend with their children has been shown to vary across socioeconomic status, racial, and ethnic groups in American families (Altintas, 2016; Cabrera & Tamis-LeMonda, 2013; Offer & Kaplan, 2021), with differences related to individual characteristics and specific family circumstances, as well as to the measures and constructs used to assess maternal and paternal involvement (Offer & Kaplan, 2021). Nevertheless, some authors suggest that what matters the most for child development and wellbeing is the *quality* of the time spent together, regardless of the *quantity* of time fathers spend with their children (McBride et al., 2002). Social policies are gradually starting to catch up with societal changes, at least in part. Many countries have implemented paid paternity leave,

corporate policies for working fathers are slowly improving, and shared custody is becoming an increasingly common practice, acknowledging that a father's involvement is essential for a child's healthy development (Cabrera & Tamis-LeMonda, 2013; Feldman, 2023; Steinbach & Augustijn, 2022). Research, however, has not kept pace with these rapid social changes. Despite the clear shift in fathering roles and the fact that infants nowadays are reared by a different sort of dad than their parents, much of what is currently known about parenting and child outcomes is still largely drawn from studies focusing on the mother-child relationship (Feldman, 2023).

Additional support for the importance of investigating the father-specific contribution to offspring mental health comes from theoretical and empirical evidence suggesting that fathers and mothers are likely to have different impacts on their children's behavioural and emotional outcomes (Bögels & Phares, 2008; Fisher et al., 2021; Natsuaki et al., 2014; Ramchandani & Psychogiou, 2009). For instance, preliminary research findings indicate that, at least during infancy, paternal depression might be a weaker environmental risk factor compared to maternal depression (Natsuaki et al., 2014). On the contrary, theoretical and empirical evidence suggests that their evolutionary-based prominent role in the socialisation and encouragement of their children's autonomy may make fathers particularly central for children's resilience and socioemotional development (Feldman, 2023). In turn, this unique role is likely to be negatively impacted by paternal psychopathology, thus increasing the risk of the development of emotional problems in their children (Bögels & Phares, 2008; Bögels & Perotti, 2011; Majdandžić, Möller, de Vente, Bögels, & van den Boom, 2014; Ramchandani & Psychogiou, 2009; Winnicott, 1964). Bögels and Perotti (2011) focused specifically on social anxiety and theorised that, for children, information on social signals and threats from fathers is more influential relative to mothers, because of fathers' evolutionary rooted, specialised role of confronting the external world; thus, if fathers manifest social anxiety, children interpret it as a strong negative signal about the external social world, adjusting their beliefs, and potentially developing social fears and anxiety (Bögels & Perotti, 2011). Some empirical evidence exists in

support of the unique role of fathers in the development of child (social) anxiety (e.g., Majdandžić et al., 2014; Möller et al., 2015; Möller et al., 2016). Indeed, at least as long ago as Ancient Rome, fathers have assumed the role of assisting the child in separating from the mother, who represented a nurturing safe base, providing a way into the outside world (Abelin, 1975; Bowlby, 1988; Mahler & Gosliner, 1955; Paquette, 2004; Winnicott, 1964), and these historical differences in roles provide a theoretical rationale to consider parent-child associations as potentially different for fathers and mothers (Weijers, Van Steensel, & Bögels, 2018).

### **1.5.2 Mechanisms Through Which Fathers Influence Child Mental Health**

The mechanisms involved in the transmission of vulnerability from fathers to their children, particularly in the context of paternal anxiety, remain unclear (Barker et al., 2017; Zhou et al., 2024).

Theoretical frameworks can guide our understanding of how fathers influence child mental health. As discussed in section 1.3.1, the aetiology of psychopathology in offspring is thought to result from a combination of genetic vulnerabilities and environmental stressors (Purves et al., 2020; Smoller, 2016). This occurs through gene-environment correlations (where genetic risk might influence the choice of specific types of environments) and gene-environment interactions (where genetic predisposition might influence development depending on the environmental context; Jami et al., 2021; Scarr & McCartney, 1983). The model proposed by Ramchandani and Psychogiou (2009) is particularly relevant in this context, as it outlines potential mechanisms of risk transmission specifically from fathers to children, including both genetic and environmental pathways (see Figure 1.1). Primarily derived from research on paternal depression, this model was adapted from the framework by Goodman and Gotlib (1999) on risk transmission among children of depressed mothers. It considers both the *direct* impact that paternal psychopathology may have on the father-child relationship and parenting behaviours, as well as indirect effects *mediated* by influences on the couple relationship and

maternal mental health, which can take place also prenatally (e.g., Ahmadzadeh et al., 2019; Eley et al., 2015; Rice et al., 2010). Additionally, Ramchandani and Psychogiou (2009) propose that variables such as child age, sex, temperament, parental socioeconomic status, and paternal involvement could modify the association between paternal psychopathology and child outcomes, as discussed in section 1.4.4.

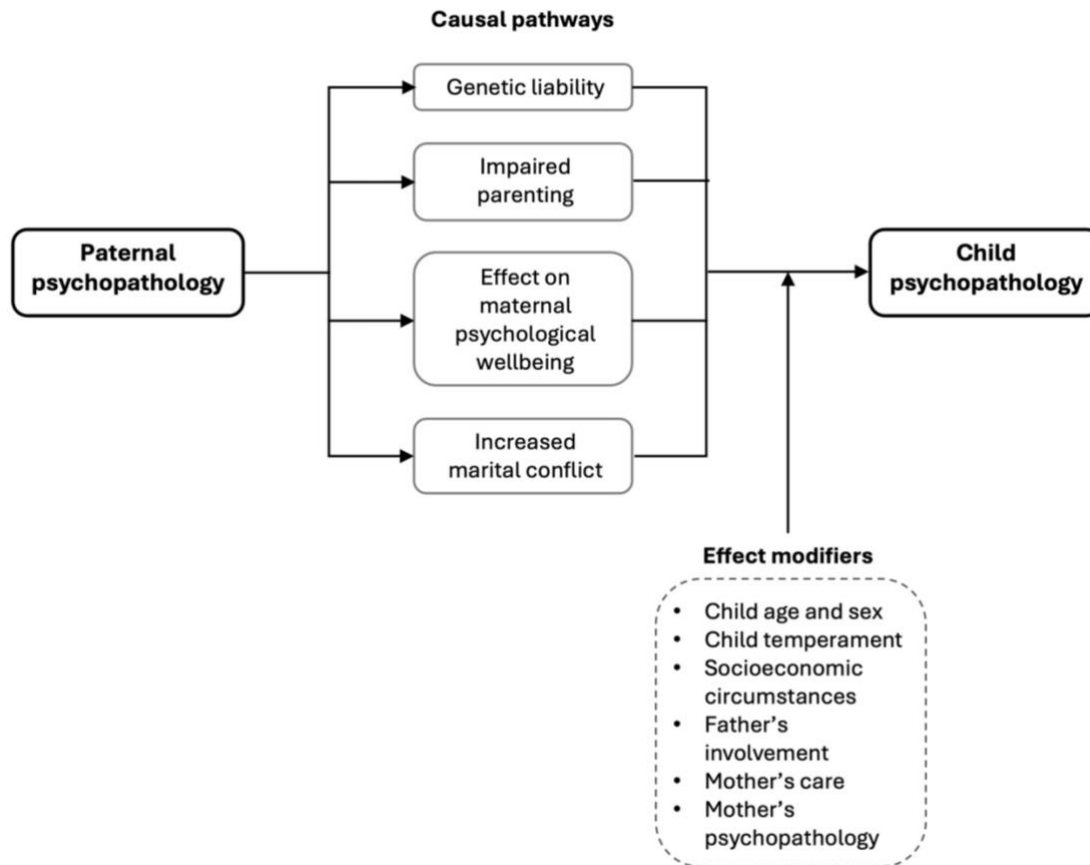


Figure 1.1 Model of the Mechanisms of Risk Transmission from Fathers to Children Proposed by Ramchandani and Psychogiou (2009)

### 1.5.2.1 Fathers' Genetic Contributions

Fathers make genetic contributions to child development, providing half of the children's genetic material. The heritability of anxiety disorders is estimated in the range of 20 to 60% (Craske et al., 2017; Polderman et al., 2015); however, candidate gene studies of anxiety disorders have not found robust gene-disorder associations (Smoller, 2016) and research suggests that a multitude of common genetic variants with modest effects and shared with other emotional disorders account for the risk for anxiety disorders (Purves et al., 2020; Smoller,

2016). Further, genetically informed studies which examine the intergenerational transmission of risk have demonstrated that the association between parental anxiety and offspring mental health outcomes is not significantly confounded by genetic relatedness and that environmental influences play a key role (Ahmadzadeh et al., 2019; Eley et al., 2015; Murray et al., 2009; Rice et al., 2010).

### **1.5.2.2 Direct Pathways: Impact on Parenting**

Early parent-infant interactions, starting from birth, are crucial for various aspects of child development, and paternal mental illness, similarly to maternal mental illness, can compromise the parent's ability to care directly for their offspring and the quality of the parent-child interaction (Fisher et al., 2021; Ramchandani & Psychogiou, 2009). However, while maternal mental health has been studied extensively over the years, paternal mental health is often overlooked as a key influence on child health (Fisher et al., 2021).

Paternal mental illness can affect fathers' involvement with his children in several ways. For example, research indicates that fathers with depression tend to spend less time with their children compared to fathers without depression (Bronte-Tinkew, Moore, Matthews, & Carrano, 2007) and that paternal depression is linked to a reduction in positive father-child interactions, with fewer activities such as reading, playing, and hugging, and higher rates of conflict (Davis, Davis, Freed, & Clark, 2011; Lyons-Ruth, Wolfe, Lyubchik, & Steingard, 2002; Sethna, Murray, Edmondson, Iles, & Ramchandani, 2018). In turn, the decreased father-child engagement is associated with negative effects on child development, including reduced expressive vocabulary by the age of two (Paulson, Keefe, & Leiferman, 2009). Furthermore, anxious fathers tend to exhibit more controlling and rigid behaviour with their children (Bögels & Phares, 2008; Epkins & Harper, 2016; Teetsel, Ginsburg, & Drake, 2014), and empirical evidence shows that controlling parenting is a risk factor in the development of child anxiety (Thirlwall & Creswell, 2010).

### 1.5.2.3 Mediated Pathways: Impact on Mothers and the Couple Relationship

Paternal mental health has also an important impact on mothers (Cardenas et al., 2022; Fisher et al., 2021; Ramchandani & Psychogiou, 2009). Fathers often play a crucial role in providing both practical and emotional support to mothers as the family adjusts to the arrival of a new baby (Cheng et al., 2016; Stapleton et al., 2012). Their support can significantly help mothers cope with fatigue and engage positively with their infant, which not only lowers the risk of maternal postpartum depression but also mitigates negative parenting behaviours such as hostility or intrusiveness (Barker, 1995; Van den Bergh, Mulder, Mennes, & Glover, 2005). Having an untreated mental illness, such as depression or anxiety, is likely to diminish both the quantity and effectiveness of fathers' practical assistance, particularly in sharing care responsibilities of a newborn, affecting their ability to care directly for the offspring and the way in which they interact with their children (Psouni & Eichbichler, 2020; Ramchandani & Psychogiou, 2009; Sethna, Murray, Netsi, Psychogiou, & Ramchandani, 2015). Partner support and relationship satisfaction have an impact in the development of both maternal and paternal depression and other mental health conditions, as well as in parents' involvement with the infant (Don & Mickelson, 2012; Figueiredo et al., 2018). Therefore, it is not surprising that research shows a moderate correlation between the depression levels of fathers and mothers, and that fathers' responses to common parenting challenges, like handling fussy infants, can lead to frustration and depressive symptoms (Cook et al. 2017; Paulson and Bazemore 2010; Pinheiro et al. 2006).

Paternal mental illness is associated with an increased risk of marital conflict and unhappiness, exposure to which, in turn, is associated with an increased risk of childhood mental health difficulties (Mark Cummings, Keller, & Davies, 2005; Ramchandani & Psychogiou, 2009), consistently with models of parental socialisation of emotions (e.g., Eisenberg et al., 1998). Paternal mental illness, particularly when chronic, severe and characterised by behavioural problems, can affect the mother's mental health directly, through erratic or antisocial behaviours, and indirectly by impacting family conditions, resulting in time off work, loss of income, unemployment, inadequate housing, and socioeconomic hardship (Fletcher et

al., 2011; Ramchandani & Psychogiou, 2009). For instance, paternal binge-drinking was found to be linked to a higher risk of intimate partner violence, which in turn is associated with increased maternal depression and compromised parenting (Bailey 2010; Black 2011; Mumford et al. 2018).

#### **1.5.2.4 What Is Known Regarding the Mechanisms of Risk Transmission from Anxious Fathers to Their Children**

To date, limited research has explored the mechanisms by which paternal anxiety, particularly during the perinatal period, may influence child mental health outcomes. A further limitation is that the focus of most studies on parenting (and its impact on child development) has primarily been on those behaviours that have traditionally been considered within the “maternal” domain (e.g., caring, nurturing, protective behaviours; Lawrence et al., 2019b), while only more recent research is beginning to include assessments of “challenging parenting” (which describes playful encouragement of the child to take risks or to go outside their comfort zone and has traditionally been considered a behaviour within the father’s domain; Majdandžić et al., 2014). In this regard, Möller et al. (2015) found an association between fathers’ social anxiety disorder symptoms and less challenging parenting behaviour and more overinvolvement, and in a meta-analysis looking at the differential associations between maternal and paternal parenting behaviours (i.e., overcontrol, overprotection, overinvolvement, autonomy granting, challenging parenting) and anxiety and its precursors (i.e., fearful temperament, behavioural inhibition, shyness) in children between 0 and 5 years, Möller et al. (2016) found a significant association between challenging parenting behaviour and child anxiety for fathers ( $r = -.19$ , 95% CI [.03, .33]), but not for mothers. Importantly, this meta-analytic evidence is based on only two eligible studies, so findings must be considered tentative. In a longitudinal study investigating social referencing with mothers and fathers with and without lifetime anxiety disorders, Aktar et al. (2013) found that higher levels of expressed paternal anxiety toward strangers predicted infant avoidance of strangers for moderately or highly temperamentally inhibited infants, with effect sizes comparable to the mother-child

association. Taken together, these studies indicate that paternal anxiety might impact child mental health via an influence on fathers' behaviours when interacting with the child. However, the specific causal mechanisms of risk transmission from anxious fathers remain to be identified.

### **1.5.2.5 Prenatal Versus Postnatal Effects of Paternal Mental Illness on Their Children**

It remains unclear whether direct *postnatal* exposure to paternal mental ill-health is necessary to observe adverse outcomes in children (e.g., Ahmadzadeh et al., 2021), or whether indirect *prenatal* exposure to fathers' mental ill-health can be sufficient for the development of poor child mental health (Barker et al., 2011). For instance, fathers might influence child development prenatally via genetic and epigenetic processes (e.g., fathers' exposure to early life stress or health behaviours prenatally can influence their genetic contributions to their children; Cardenas et al., 2022), or exerting an impact on maternal mental health, and thus affecting the foetus during pregnancy (e.g., Psouni & Eichbichler, 2020; Ramchandani & Psychogiou, 2009; Sethna et al., 2015). However, in a longitudinal study using data from a UK population cohort, Capron et al. (2015) found no significant association between paternal prenatal (18 weeks gestation) anxiety or depression and their children's anxiety disorders at age 18 years. To examine the differential effects of paternal prenatal-only and postnatal-only depression for children's mental health, Ramchandani et al. (2008) analysed data from a large UK-based cohort study and used a natural experiment design, comparing child emotional and behavioural problems and psychiatric diagnoses in four groups: children whose fathers were not depressed perinatally, children whose fathers were depressed only prenatally, children whose fathers were depressed only postnatally, and children whose fathers were depressed both pre- and postnatally. The results showed that, overall, children of fathers depressed both pre- and postnatally had the highest risk of subsequent emotional/behavioural problems at 3.5 years and psychiatric diagnosis at 7 years (Ramchandani et al., 2008). This suggests that exposure to paternal depression during both the prenatal and postnatal periods may be necessary for children to manifest mental health difficulties, although some differences

emerged depending on the specific child outcomes being examined (Ramchandani et al., 2008). However, no studies have been conducted to disentangle the impact of prenatal and postnatal paternal *anxiety* on child mental health. Importantly, the unique design used by Ramchandani et al. (2008) allows to distinguish between prenatal and postnatal paternal psychopathology and consider what additional effect exposure to postnatal psychopathology may have on children's mental health, proving particularly useful to examine potential mechanisms by which the intergenerational transmission of risk from fathers to their offspring may occur. Specifically, in the context of anxiety, this prenatal vs postnatal design could be used to test whether psychosocial factors, including the parenting context, account for the link between paternal anxiety and child outcomes.

As a note, although the focus of this thesis is on the transmission of risk from parents to their offspring, it is important to consider that child-to-parent effects are also likely, whereby child characteristics, such as a temperament or behavioural/emotional problems, increase the risk of mental illness in the parent or affect the parenting behaviour, resulting in environmentally mediated transactional effects between parents and offspring (Ahmadzadeh et al., 2019; Bögels & Phares, 2008; Elgar, Curtis, McGrath, Waschbusch, & Stewart, 2003; Fanti, Panayiotou, & Fanti, 2013).

Crucially, understanding the causal mechanisms of risk transmission from one generation to the other remains of paramount importance to enable effective targeting of efforts at prevention and treatment of child mental ill-health.

### **1.5.3 How to Help Parents with a History of Mental Illness Support Their Children**

A further limitation in the field is the current limited understanding of how best to support (anxious) parents in promoting their children's mental health. Considering the high prevalence of anxiety among parents, the risk posed to their children's development, and the importance of advancing in the prevention of child mental ill-health (Ahmadzadeh et al., 2021; Lawrence et al.,

2019a; Leiferman et al., 2021; McGorry et al., 2024), this knowledge gap holds key research and clinical relevance.

In the sections above, I have presented theoretical models and discussed empirical evidence of the importance of parents for the development of their children. Parental mental illness, including anxiety, can pose a significant risk for child mental health, negatively affecting multiple aspects of parenting and conferring vulnerability to the offspring via genetic and environmental mechanisms. Hence, parental mental illness represents a key target for interventions aimed at preventing child mental ill-health (Arango et al., 2018; Reupert et al., 2022), with available evidence supporting the positive effects of managing of parental psychopathology to reduce the risk of poor mental health among their offspring (e.g., Ginsburg et al., 2015; Siegenthaler et al., 2012). In this regard, however, more research examining the potential benefits of treating parental mental health for children's mental health is paramount. This is clearly highlighted by two recent systematic reviews aimed at assessing whether interventions for parental anxiety (Chapman et al., 2022) or for parental bipolar disorder and schizophrenia (Can, Piskun, Dunn, & Cartwright-Hatton, 2024) had any effect on the mental health or wellbeing of their children. Crucially, the authors identified no eligible randomised controlled trials that met the inclusion criteria, resulting in "empty" systematic reviews.

Research into parenting and mental illness has typically been informed by a deficit-based approach, which focuses on the risks to children when a parent has a mental illness (Mowbray, Oyserman, Bybee, & MacFarlane, 2002; Rutter & Quinton, 1984; Silverman, 1989), with limited attention directed at ways to engage, empower, and support parents in treatment and prevention programmes (Lawrence, Parkinson, Jasper, Creswell, & Halligan, 2021). Limited research on the needs and experiences of parents with chronic and severe mental illnesses documents the specific challenges these parents report. For example, a systematic examination of qualitative evidence on the early experiences of mothers with bipolar disorder identifies the presence of a conflict between the societal expectation of being a good mother and the limitations imposed by living with a severe mental illness (Wilson & Crowe, 2009).

Mothers with a severe mental illness often experience guilt about their parenting abilities and the potential risk of passing on their mental illness to their child (Campbell & Poon, 2020; Wilson & Crowe, 2009). Additionally, the stigma associated with mental illness appears to intensify in the context of motherhood, making mothers less likely to seek support and more prone to feelings of isolation during this period (Campbell & Poon, 2020; Wilson & Crowe, 2009). Research on the early parenthood experiences of men with chronic or severe mental disorders is still lacking (Aktar et al., 2019a). Furthermore, to the best of my knowledge, no study has qualitatively examined which kind of support parents with a mental illness would need to *prevent* poor mental health outcomes in their children.

To ensure that prevention programmes and services aimed at supporting parents with a mental illness in the prevention of their children's mental ill-health are adequate, accessible and acceptable for their targeted users, it is necessary to investigate these parents' knowledge of intergenerational risk transmission, their support needs, and their views of the facilitators and barriers to service access. Existing qualitative research has focused on perceived barriers and facilitators to seeking and accessing *treatment* for mental health problems (Radez et al., 2021a), including child anxiety difficulties (Reardon et al., 2018), and *prevention* programmes (Festen et al., 2014; Lawrence et al., 2020b). Parent-reported obstacles to seeking and accessing professional support for their children's anxiety include difficulties in identifying and assessing the severity of their child's anxiety, struggles in recognising the need for help, with stigma contributing to parental reluctance to seek support, as well as structural barriers, such as lack of available services and high demands on existing services (Reardon et al., 2018). In terms of accessing *prevention* programmes, research found that the potential barriers perceived by adolescents with anxiety disorders and their mothers partly echo those reported in studies focused on treatment access, such as difficulties in recognising early signs and identifying anxiety as a problem, while others are specific to prevention, including aspects related to possible negative consequences of anxiety prevention (e.g., stigmatising children) and fears of being dismissed by healthcare professionals (Lawrence et al., 2020b). Possible

facilitators for accessing prevention services include raising awareness about anxiety prevention programmes and involving parents and schools in promoting and delivering prevention (Lawrence et al., 2020b). In a qualitative study specifically aimed at investigating how anxious or depressed parents perceive their children's risk for mental health problems and need for prevention, Festen et al. (2014) found that, despite frequently reporting concerns about their children's emotional or behavioural problems, most parents do not see a direct link between their own symptoms and child wellbeing. Perceived barriers to accessing prevention for their children's mental health difficulties included a lack of awareness of the professional help available, perceived lack of necessity for professional help for the child, as well as shame, stigma, and embarrassment about anxiety and depression or being in treatment (Festen et al., 2014). Taken together, these studies highlight the importance of collecting the views and needs of people with lived experience of mental illness in order to address the existing barriers to access and provide services that are acceptable and accessible. Moreover, the findings point to a need of more adequate support for parents with a mental illness, or whose children present mental health difficulties, as well as of educating parents on the intergenerational risk transmission and on the help available, while reducing the shame and stigma associated with mental illness.

However, no study to date has examined the views and needs of anxious mothers and fathers with regard to the prevention of their children's mental ill-health. Further, in England, mental health services are struggling to meet the increased demand for care, with long waiting lists, delayed treatments and affected accessibility (British Medical Association, 2024; National Audit Office, 2023), and there are currently no clinical NHS services aimed at preventing the negative impacts that parental anxiety can have on their children (Reardon et al., 2018).

## **1.6 Aims of this Thesis**

The overall goal of this thesis is to advance the promotion of mental health among children with anxious mothers and fathers. This goal is addressed by tackling some of the

existing knowledge gaps in the field (discussed in section 1.5), specifically shedding light on the contribution of paternal anxiety to offspring mental health and on the needs of anxious parents related to promoting their children's mental health. Three main research questions were addressed by the three studies included in this thesis:

- 1) What is the magnitude of the association between paternal anxiety and offspring emotional and behavioural problems?
- 2) Is paternal perinatal anxiety prospectively associated with child mental health difficulties and what are the mechanisms of risk transmission?
- 3) What do anxious parents need to promote their children's mental health?

Specifically, Paper 1 (presented in Chapter 2) provides a comprehensive estimate of the magnitude of the association between paternal anxiety and offspring emotional and behavioural problems. Informed by the findings in Paper 1, Paper 2 (presented in Chapter 3) focuses on the father-specific contribution to the intergenerational transmission of mental illness, attempting to disentangle the differential effects of postnatal and prenatal exposure to paternal perinatal anxiety on children's mental health. Motivated by the collective findings of the previous two studies and of the broader literature, highlighting the importance of both maternal *and* paternal anxiety for child mental health, Paper 3 (in Chapter 4) zooms out of the father-specific focus and presents the views and needs of parents with lived experience of anxiety in relation to their children's mental health and the prevention of difficulties developing for them.<sup>1</sup>

The research questions addressed by the three papers were shaped and refined by experts by experience (a patient and public involvement group that included parents with lived experience of anxiety and an NHS clinical service lead). The value of patient and public

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<sup>1</sup> My original PhD project also included an experimental study investigating the mechanisms underlying the transmission of anxiety from fathers to their infants, building on the social learning accounts for the development of anxiety in infancy. The peer-reviewed stage 1 registered report received in principle acceptance in *Developmental Psychology* (Zecchinato et al., 2023) and is included in Appendix B. However, recruitment for the study proved to be particularly difficult and could not be completed within the timeframe, hence the study was removed from the PhD project.

involvement (PPI) in health and social care research, which entails research carried out with or by members of the public, rather than on, about, or for them, is increasingly being recognised, as it can help ensure that studies are designed and conducted in a sensitive and appropriate manner and that the focus is on issues that are relevant to patients and the public, thus improving the overall quality of the research (Brett et al., 2014; Evans et al., 2015; Staniszewska et al., 2017; "UK Standards for Public Involvement," 2019).

In the next section, I provide a brief description and justification for the three papers included in this thesis and the methods used.

### **1.6.1 Paper 1: A Systematic Review and Meta-analysis: Paternal Anxiety and the Emotional and Behavioural Outcomes in Their Offspring**

Paper 1 is a systematic review and three-level meta-analysis of the association between paternal anxiety (symptoms and disorders) and offspring emotional and behavioural problems.

Systematic reviews help provide a systematic synthesis of all the available literature pertaining to a precise research question, while meta-analyses involve quantitatively combining the results across studies, yielding an overall statistic that quantifies the size of an effect, and allow to test the impact of potential moderators of associations (Ahn & Kang, 2018). Providing a rigorous overview of the existing evidence on a particular topic, systematic reviews and meta-analyses have great value in all research areas, and can guide directions for future research and practical applications (Higgins et al., 2024). To ensure systematicity, the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA; Page et al., 2021a) guidelines were followed in designing, conducting, and reporting the study.

Scoping searches were used to define the research question and guide the development of the inclusion and exclusion criteria, and the search strategy was refined with the help of a Psychology Research Engagement Librarian. The methods, inclusion and exclusion criteria, and analysis plan were preregistered on PROSPERO (<https://www.crd.york.ac.uk/PROSPERO/>; ID: CRD42022311501) before starting the screening process, ensuring transparency and

replicability of the procedures (Garg, Hackam, & Tonelli, 2008). Because existing systematic reviews and meta-analyses on the intergenerational risk transmission from anxious parents have focused on samples comprising only or mainly mothers (e.g., Lawrence et al., 2019a; Micco et al., 2009) and have only examined emotional outcomes in children (e.g., Ahmadzadeh et al., 2021; Trepia et al., 2022), the aim of this paper was to synthesise and provide a pooled estimate of the magnitude of the association between paternal anxiety and offspring emotional and behavioural problems, without setting age limits for the offspring. Moreover, a range of potential moderators, informed by theoretical and empirical evidence (Connell & Goodman, 2002; Ramchandani & Psychogiou, 2009), were included in the analysis plan.

Considering the variety in methods, measures, and designs used in the available literature, considerable between-study heterogeneity was anticipated, hence random-effects models were used to pool effect sizes (Harrer, Cuijpers, Furukawa, & Ebert, 2021). Because most of the included studies contributed multiple effect sizes, and the same sample was used by multiple studies, thus following a nested structure (e.g., individual effect sizes nested within samples), random-effects three-level models were used, which allowed to include all the available data and account for the dependencies in the data (Cheung, 2014; Harrer et al., 2021).

However, there are limitations to systematic reviews and meta-analyses. Particularly, publication bias, that exists when the probability of a study getting published is affected by its results (e.g., studies with null or negative results not submitted or accepted for publication; Rothstein, Sutton, & Borenstein, 2005), can lead to a skewed view of the evidence, such as overestimations of the strengths of associations or of an intervention's effectiveness (Ahn & Kang, 2018; Harrer et al., 2021; McAuley, Tugwell, & Moher, 2000). One way to minimise the risk of publication bias is to attempt to gather all available evidence, including grey literature in the search criteria (e.g., doctoral theses and yet-to-be published studies) and thus providing a more realistic and up-to-date picture of the field (Bellefontaine & Lee, 2014; McAuley et al., 2000; Paez, 2017). It is also good practice to assess the presence of potential publication bias via statistical procedures, specifically using small-study effect methods that are based on the

assumption that publication bias exists because significant results are more likely to be published, and since the probability of obtaining significant results rises with larger sample sizes, publication bias will disproportionately affect small studies (Borenstein, Hedges, Higgins, & Rothstein, 2021; Rothstein et al., 2005).

Further, time and resource constraints often lead authors to restrict searches to English language only; however, this can mean excluding valuable international data and cultural insights (Neimann Rasmussen & Montgomery, 2018; Stern & Kleijnen, 2020), leading to language bias (Page, Sterne, Higgins, & Egger, 2021b).

To minimise bias and the risk of obtaining distorted results, no limits to publication language or date were applied to the search strategy, and searches of grey literature were also conducted. Moreover, the presence of potential publication bias was examined with statistical procedures and the references of the excluded papers were provided to increase transparency and reproducibility. Finally, the methodological quality of the included studies was evaluated with the Newcastle-Ottawa Scale, which is a tool recommended by the Cochrane Collaboration (Wells et al., 2000).

### **1.6.2 Paper 2: The Impact of Perinatal Exposure to Paternal Anxiety on Offspring: A Prospective Study Using the Avon Longitudinal Study of Parents and Children (ALSPAC) Cohort**

Building on the results of Paper 1, where small but significant associations between paternal anxiety and offspring emotional and behavioural difficulties were found, Paper 2 sought to dive deeper into the investigation of the role played by fathers in the intergenerational transmission of risk and disentangle underlying mechanisms. Specifically, a large UK-based birth cohort study, the Avon Longitudinal Study of Parents and Children (ALSPAC), was used to conduct a prospective study adopting a prenatal vs postnatal design, taking into account the call for more longitudinal studies to advance the understanding of the influence of fathers across different developmental epochs (Feldman, 2023). The aim was to test the impact of the

exposure to different timings of paternal perinatal anxiety on children's subsequent psychological functioning, also accounting for the potential effect of the familial context (including sociodemographic variables such as paternal age, education, ethnicity, social class and marital status), maternal and paternal current and past mental health, and child temperament, which have been proposed to have an impact on the transmission of risk across generations (Connell & Goodman, 2002; Goodman & Gotlib, 1999; Lawrence et al., 2019b; Ramchandani & Psychogiou, 2009).

Following the study design by Ramchandani et al. (2008), child outcomes at 42- and 91-months were compared in four mutually exclusive groups: children whose fathers were anxious neither prenatally nor postnatally, children whose fathers were anxious prenatally only, children whose fathers were anxious postnatally only, and children whose fathers were anxious both prenatally and postnatally. This unique research design enabled to distinguish prenatal (i.e., indirect) vs postnatal (i.e., direct) mechanisms of intergenerational risk transmission from fathers to their children. Thus, it was possible to test 1) whether paternal perinatal anxiety is associated with child poor mental health at 42 and 91 months, and 2) whether postnatal exposure to paternal anxiety is necessary to observe adverse child mental health outcomes, as suggested by the findings of a recent meta-analysis of genetically informed research looking at the associations between parent anxiety and child emotional problems (Ahmadzadeh et al., 2021), or whether prenatal exposure to paternal anxiety can be sufficient for the development of emotional and behavioural difficulties in children, for example via an impact on maternal mental health and on the familial environment, as indicated by studies supporting the foetal programming hypothesis (Barker, 1995; Barker et al., 2011; Monk et al., 2019; Van den Bergh et al., 2005).

One of the main challenges in large observational studies is represented by cohort attrition, resulting in missing data that, if handled inadequately, can compromise the study inferences and lead to biased estimates (White, Royston, & Wood, 2011). While complete case analysis is possible (i.e., removing from the analyses any case from the dataset that has a

missing value for the outcome or for any predictor), this reduces the sample size and thus the statistical power of the study (Jakobsen, Gluud, Wetterslev, & Winkel, 2017). Statistical methods exist to handle missing data. Multiple imputation (Rubin, 2004) is a valid and widely used statistical technique that involves using the distribution of the observed data to estimate a set of plausible values for the missing data (Harel & Zhou, 2007; Horton & Kleinman, 2007; Rubin, 2004). Multiple imputation comprises three key phases: 1) generating multiple imputed datasets, 2) separately analysing each imputed dataset to obtain a set of parameter estimates, and 3) combining the estimates from the multiple imputed datasets into an overall estimate, variances and confidence intervals (Little & Rubin, 2019; Rubin, 2004). Importantly, there are many nuances that go into doing multiple imputation well, and it is of utmost importance to report the imputation models used, so that the analyses can be replicated (Little & Rubin, 2019; Rubin, 2004).

To ensure transparency (Jakobsen et al., 2017; Little & Rubin, 2019; White et al., 2011), the study procedures and analysis plan for Paper 2 were pre-registered and made publicly available on Open Science Framework (<https://doi.org/10.17605/OSF.IO/DJUKV>); analyses at both time points (i.e., for child outcomes at 42 and 91 months) were reported for complete cases as well as adjusting for covariates, where missing data were handled via multiple imputation methods; and the assumptions and imputation methods used were clearly stated and included in the manuscript.

### **1.6.3 Paper 3: Promoting the Mental Health of Children with Anxious Parents: A Qualitative Investigation of Parents' Views and Needs**

Papers 1 and 2 add to the body of evidence in support of the importance of fathers' mental health for the development of their children, showing that paternal anxiety is associated with increased risk of child emotional and behavioural difficulties, similarly to what is known for mothers and also when controlling for maternal mental health, and highlighting that fathers should not be overlooked in research and clinical practice. Hence, Paper 3 includes both

mothers' and fathers' accounts regarding the promotion of their children's mental health and the support they need to prevent the potential negative impact of their anxiety.

Existing literature highlights the benefits for the quality of care of engaging users or potential users of mental health services in the design, delivery and evaluation of the services, enabling the expression and recognition of their voices (Barnes & Wistow, 1994; Bombard et al., 2018). However, despite the recognition of need to prevent the increasing rates of mental ill-health among CYP (McGorry et al., 2024) and of the relevance of parental anxiety for child subsequent mental health (Lawrence et al., 2019a; Trepia et al., 2022), a clinical NHS service aimed at supporting anxious parents in the promotion of their children's development is currently lacking in England. Thus, it is key to understand the experiences and views of these parents, in order to design an accessible and acceptable service that can adequately support parents who have experienced anxiety difficulties in the prevention of their children's mental ill-health.

Considering that mental illnesses have often an early onset (Solmi et al., 2022) and that the first years of life are a particularly sensitive period for the exposure to environmental adversity, including parental mental illness (Cowan, Callaghan, Kan, & Richardson, 2016), prevention efforts focused on preschool-age children at-risk may be particularly effective (Arango et al., 2018). Consequently, Paper 3 targeted parents with experience of an anxiety disorder (and who completed an NHS talking therapy for this) with at least one preschool child. The views of anxious parents regarding what they would need from a service aimed at supporting them in the prevention of the potential negative impacts of parental anxiety on their young offspring were captured via online semi-structured qualitative interviews.

Qualitative interviews are extensively used in qualitative research to explore and gain in-depth insights into participants' experiences and perspectives related to a particular research topic (Edwards & Holland, 2013; Rubin & Rubin, 2011). The transactional nature of semi-structure interviews offers consistency in the interview process across the participants, via the use of an indicative topic guide or a pre-prepared set of questions, as well as a degree of

flexibility, with opportunities for respondents to raise new issues or ideas (Braun & Clarke, 2013, 2022; Edwards & Holland, 2013). The introduction of digital technologies in people's daily lives led to an increase in the use of alternative interview methods, including online video calls, telephone interviews and online chat and email interviews, in addition to the traditional face-to-face mode (Edwards & Holland, 2020). Video interviews are considered to be most similar to the face-to-face interview, with the additional benefit of expanding the potential study population for inclusion, as people can participate regardless of where they live, and time and cost constraints are also minimised (Edwards & Holland, 2020; Lo Iacono, Symonds, & Brown, 2016; Saarijärvi & Bratt, 2021). Despite these advantages, some limitations of online video interviews have also been highlighted. In particular, video interviewing requires access to reliable technology (e.g., a stable internet connection, camera, microphone) and some groups may be excluded because they are not familiar with, or do not have access to, the technology required (Krouwel, Jolly, & Greenfield, 2019). Further, there is a potential risk that another uninvited (and not visible) person is present in the room, potentially influencing the respondent; this may introduce confidentiality issues, especially if sensitive topics are to be addressed in the interview (Saarijärvi & Bratt, 2021). Given the aim of recruiting parents from different locations and backgrounds across England, limiting the geographical, time and expense barriers, for this study I interviewed participants using online video calls (via Microsoft Teams), and I felt that this mode of communication was common to all involved. Video calls were preferred to telephone calls as they facilitate the identification of participants, reducing the threats to data quality and integrity (Jones et al., 2021).

The views and perspectives of parents were analysed using reflexive thematic analysis (Braun & Clarke, 2006, 2022), which was chosen because it fits with the purpose of addressing a research question related to people's experiences, while allowing the researcher to identify and reflect on patterns within the data (Braun & Clarke, 2006, 2022). Codes, which are words or short phrases, are used to label sections of the data, and codes that are similar in meaning are then grouped to form themes (Braun & Clarke, 2006). These themes aim to capture the

underlying meaning of people's narratives as they are interpreted by the researcher. This process is reflexive because the researchers actively engage with the data, reflecting and interpreting the patterns identified (Braun & Clarke, 2006, 2022). Due to the subjective nature of this analysis, transparency is essential in reporting the analytic procedures and the theoretical framework (Braun & Clarke, 2006, 2022). Indeed, as highlighted by Braun and Clarke (2024), the most common problems in thematic analysis research centre around a lack of methodological coherence, and clarity and detail in reporting. In this study, I used an experiential qualitative framework, where the analysis aimed to capture and explore people's own perspectives and understandings (Braun & Clarke, 2022). The ontological approach adopted was critical realist, as I understood participants' views to be real, meaningful expressions of situations from their own lives and experiences (Braun & Clarke, 2022; Willig & Rogers, 2017), while the epistemic approach was phenomenological, which is coherent with the focus of this study on first-person lived experiences and needs (Braun & Clarke, 2022). To produce a coherent and reflexively open report of reflexive thematic analysis, I followed the Reflexive Thematic Analysis Reporting Guidelines (RTARG; Braun & Clarke, 2024) and I actively reflected on how my own experiences and knowledge shaped the study, maintaining a reflexive diary and including a reflexive statement in the paper.

In an attempt to improve the experience of participation in the research process and increase its relevance for anxious parents, clinicians, and the wider public, this study was conducted with a PPI advisory group that included parents with lived experience of anxiety and an NHS clinical service lead. While embedding PPI in research is increasingly encouraged, one issue is that the reporting of PPI in scientific papers is often inconsistent and partial, with limited information provided about the context, process, and impact of public involvement on the research conducted (Staniszewska, Brett, Mockford, & Barber, 2011; Staniszewska et al., 2017). To ensure quality and transparency of PPI reporting, I have detailed the use of PPI in Paper 3 following the Guidance for Reporting Involvement of Patients and the Public checklist 2 short form (GRIPP2-SF) proposed by Staniszewska et al. (2017).

## **1.7 Author Contributions**

Francesca Zecchinato was the lead author and wrote all three papers submitted as part of this thesis. Pete Lawrence and Jana Kreppner supervised all the stages required for the competition of the three papers. In Paper 1, Yasmin I. Ahmadzadeh, along with Pete Lawrence and Jana Kreppner, advised on the methodology for the meta-analysis and on the revisions required for the final paper. In Paper 3, Peter Bullard, Sophie Painter and Manos Kumar, experts by experience and members of the PPI group that I have set up at the start of my PhD programme, were involved in all stages of the study, advising on the study material (indicative topic guide, participant information sheet, study advertisement material) and contributing to the development of themes and interpretation of the findings.

# Chapter 2 A Systematic Review and Meta-Analysis: Paternal Anxiety and the Emotional and Behavioural Outcomes in Their Offspring

## Notes

This chapter was published as a research article:

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<https://doi.org/10.1016/j.jaac.2024.04.005>.

The work was also presented as a poster at the 27th Biennial Meeting of the International Society for the Study of Behavioural Development (ISSBD) on June 16-20 2024 in Lisbon, Portugal.

All data and analytic code are openly accessible via the Open Science Framework ([https://osf.io/g4kzf/?view\\_only1/47705e0b0362e4471bb4fd74e250fac36](https://osf.io/g4kzf/?view_only1/47705e0b0362e4471bb4fd74e250fac36)).

## CRedit (Contributor Roles Taxonomy)

Francesca Zecchinato: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing – original draft, Writing – review and editing

Yasmin I. Ahmadzadeh: Methodology, Validation, Writing – review & editing

Jana Kreppner: Conceptualization, Data curation, Investigation, Methodology, Project administration, Supervision, Validation, Writing – review & editing

Peter J. Lawrence: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Writing – review & editing

## Abstract

**Objective:** Anxiety disorders are highly prevalent worldwide; however, the literature lacks a meta-analytic quantification of the risk posed by fathers' anxiety for offspring development. This systematic review and meta-analysis aimed to provide a comprehensive estimate of the magnitude of the association between paternal anxiety and emotional and behavioural problems of offspring.

**Method:** In February 2022, Web of Science, Ovid (Embase, MEDLINE, PsycINFO), Trip Database, and ProQuest were searched to identify all quantitative studies that measured anxiety in fathers and emotional and/or behavioural outcomes in offspring. No limits were set for offspring age, publication language, or publication year. Summary estimates were extracted from the primary studies. Meta-analytic random-effects three-level models were used to calculate correlation coefficients. Quality was assessed using the Newcastle-Ottawa Scale. The study protocol was preregistered with PROSPERO (CRD42022311501) and adhered to Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) reporting guidelines.

**Results:** Of 11,746 records identified, 98 were included in the meta-analysis. Small but significant associations were found between paternal anxiety and offspring emotional and behavioural problems overall ( $r = 0.16$ , 95% CI [0.13, 0.19]) and behavioural ( $r = 0.19$ , 95% CI [0.13, 0.24]), emotional ( $r = 0.15$ , 95% CI [0.12, 0.18]), anxiety ( $r = 0.13$ , 95% CI [0.11, 0.16]), and depression ( $r = 0.13$ , 95% CI [0.03, 0.23]) problems. Some significant moderators were identified.

**Conclusion:** Paternal mental health is associated with offspring development, and the offspring of fathers with anxiety symptoms or disorders are at increased risk of negative emotional and behavioural outcomes, in line with the principles of multifinality and pleiotropy. The substantial heterogeneity among studies and the overrepresentation of White European American groups in this literature highlight the need for further research.

**Diversity & Inclusion Statement:** While citing references scientifically relevant for this work, we also actively worked to promote inclusion of historically underrepresented racial and/or ethnic groups in science in our reference list.

**Keywords:** anxiety; emotional and behavioural outcomes; fathers; intergenerational transmission; offspring.

## 2.1 Introduction

Anxiety disorders (ADs) are among the most common psychiatric conditions for men globally (Kessler, Ruscio, Shear, & Wittchen, 2010), point prevalence in adult male population: 2.2-3.8% (World Health Organization, 2017); in new fathers: 6.57-13.54% (Leiferman et al., 2021), representing a significant public health concern. Moreover, prevalence of ADs has increased since the outbreak of the COVID-19 pandemic (Rogers et al., 2020b).

Compared with children whose parents do not have ADs, children of parents with ADs are themselves at increased risk of ADs (risk ratio = 1.76, 95% CI [1.58, 1.96]; Lawrence et al., 2019a), depressive disorders (risk ratio = 1.31, 95% CI [1.13, 1.52]; Lawrence et al., 2019a), and behavioural disorders (Silverman et al., 1988). Findings from a meta-analysis by Ahmadzadeh et al. (2021) of genetically informed research designs suggest that postnatal exposure to anxiety, but not prenatal exposure, may be causally associated with concurrent emotional symptoms in offspring (offspring age range 0.75-22 years) via nongenetic mechanisms ( $r = 0.13$ , 95% CI [0.04, 0.21]). These results are in line with evidence supporting the centrality of environmental factors in the intergenerational transmission of psychopathology, even after accounting for genetic risk (Ahmadzadeh et al., 2019; Eley et al., 2015; Jami et al., 2021).

However, most of the existing evidence refers to samples comprising only or mainly mothers. Maternal mental health problems during the perinatal and postnatal period have been linked to emotional and behavioural difficulties in offspring from infancy through adolescence with small-to-moderate effect sizes (Rogers et al., 2020a). In contrast, the role of mental health problems in fathers, and anxiety specifically, in the development of children has received comparatively little attention (Barker et al., 2017; Ramchandani & Psychogiou, 2009). Moreover, research has highlighted significant correlations between maternal and paternal mental health problems (Chhabra et al., 2020), including ADs (Möller et al., 2015). Significant correlations have also been reported between maternal and paternal rearing practices that are associated with child anxiety (e.g., overinvolvement; Möller et al., 2015). Taken together, when studying the

role of environmental factors in the intergenerational transmission of psychopathology, the father's role must also be considered.

Importantly, fathers and mothers are likely to have different impacts on the behavioural and emotional outcomes of their children (Bögels & Phares, 2008; Ramchandani & Psychogiou, 2009). Theoretical and empirical evidence indicates that the evolutionary-based prominent role of fathers in the socialisation and encouragement of children's autonomy makes fathers particularly central in the development of ADs (Bögels & Phares, 2008; Bögels & Perotti, 2011; Ramchandani & Psychogiou, 2009), and these historical differences in roles provide a theoretical rationale to consider parent-child associations for fathers and mothers (Weijers et al., 2018).

Cultural factors, race, ethnicity, and socioeconomic status (SES) are likely to influence the way parents behave across cultures, societies, and historical eras (Offer & Kaplan, 2021; Paquette, 2004). The literature suggests that fathers throughout the world have an active presence in childcare and that their involvement in childcare has increased in recent decades (Sayer, 2016). This trend is partly due to the growing participation of women in the labour force (Cabrera & Tamis-LeMonda, 2013) and partly related to changing cultural expectations for gender equality and fatherhood (Thébaud & Pedulla, 2016). However, the ways in which variations due to culture and SES shape individuals' parenting are complex. The amount of time fathers spend with their children has been shown to vary across SES, racial, and ethnic groups in American families (Altintas, 2016; Cabrera & Tamis-LeMonda, 2013; Offer & Kaplan, 2021), with a mixed pattern of results depending on individual attitudes and family circumstances as well as measures and constructs used to assess paternal involvement (Offer & Kaplan, 2021). Regardless of the quantity of time fathers spend with their children, other authors have suggested that it is the quality of time spent that matters for child development and wellbeing (McBride et al., 2002).

The literature lacks a meta-analytic quantification of the risk posed by anxiety experienced by fathers for emotional and behavioural disorders in offspring. The theoretical

principle of multifinality (Cicchetti & Rogosch, 1996) holds that a single risk factor, such as paternal AD, could predict many child outcomes (for example, emotional and/or behavioural problems). Importantly, meta-analyses examining parent anxiety and child psychiatric outcomes focus only on offspring emotional disorders and symptoms (Ahmadzadeh et al., 2021; Lawrence et al., 2019a; Micco et al., 2009; Trepiak et al., 2022). For example, in the first meta-analysis of the risk posed to offspring by fathers' trait anxiety, Trepiak et al. (2022) reported a positive association between paternal and child trait anxiety ( $r = 0.13$ , 95% CI [0.07, 0.18],  $k = 39$ ,  $n = 11,683$ ). Additionally, most of the existing research looking at the intergenerational transmission of psychopathology has focused on infancy and early childhood, when the impact of parents is theorised to be particularly crucial (Field et al., 2020), although associations were shown to remain significant throughout adolescence (Capron et al., 2015; Walker et al., 2020). Nevertheless, the long-term impact of parental anxiety on offspring development has been understudied (Walker et al., 2020).

Previous research has highlighted the potential moderating effect of several sociodemographic variables (e.g., offspring sex and age, biological relatedness between the parent-offspring dyad, risk level of the parental sample) and study-level variables (e.g., measurement methods used to assess paternal anxiety and offspring outcomes, such as diagnostic interviews administered by professionals vs self-report questionnaires, time lag between the assessments, the country where the study was conducted, and the publication year of the study) that might impact the association between paternal anxiety and psychopathological outcomes of offspring.

The present study aimed to address two important gaps, namely the relatively poorly understood role of fathers in the intergenerational transmission of psychopathology and the risk posed by paternal anxiety (disorders, trait and state symptoms) for offspring emotional and behavioural outcomes from infancy to adulthood. Importantly, we are writing from a Eurocentric, heteronormative, and nuclear family perspective.

## 2.2 Method

### 2.2.1 Search Strategy and Selection Criteria

We conducted a systematic review and meta-analysis of the scientific evidence on the associations between paternal anxiety (disorders and symptoms) and emotional and behavioural outcomes of offspring. Our methods, inclusion and exclusion criteria, and analyses were preregistered (PROSPERO, CRD42022311501).

We developed our strategy in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021a) and refined it with a Psychology Research Engagement Librarian. We searched the Web of Science and Ovid (Embase, MEDLINE, PsycINFO) in February 2022, with no publication date or language limits. To identify relevant grey literature, we searched the Trip Database and ProQuest (see C.1, in Appendix C, for the full search strategy). We used EndNote 20.2 software (The EndNote Team, 2013) and the Rayyan web app (<https://rayyan.qcri.org>; Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016) to manage, screen, and review all suitable articles, and we used Accelerator for the de-duplication process (Clark et al., 2020).

We included studies in which there was an assessment of paternal anxiety via a self-report measure or diagnostic interview, in line with the DSM-5 criteria (including trait and/or state anxiety symptom measures as well as diagnostic assessments; studies focused solely on paternal posttraumatic stress disorder or obsessive-compulsive disorder were excluded); an offspring sample; and any quantitative measure of offspring emotional and/or behavioural outcomes. Studies were included only if offspring outcomes were measured no earlier than paternal anxiety because our main interest was to assess the potential impact of paternal anxiety on offspring development. Finally, all quantitative study designs were considered. We excluded records if they were reviews, commentary papers, or research protocols; did not assess paternal anxiety specifically (for clarity, studies that assessed emotional symptoms without reporting a specific measure for anxiety were also excluded); focused on offspring

identified in light of specific physical (e.g., cancer, seizures) or mental (e.g., communication or learning disorders) health problems (this criterion was included to prevent the confounding effects of offspring physical or mental health problems on fathers, given our focus on the risk posed by paternal anxiety for offspring outcomes). We sought summary estimates from the primary studies.

All titles and abstracts were screened to check whether they met the predetermined inclusion criteria. Following a calibration exercise on 100 records conducted by F.Z. and P.J.L., 52% of all returned records were double-screened by F.Z. and two research assistants independently (interrater agreement = 86%). Conflicts were examined and resolved by P.J.L. F.Z. reviewed all retained full texts, and 24% of the records were assessed a second time by an independent researcher, blinded to F.Z.'s decisions; disagreements were resolved by consensus after discussion with P.J.L. Interrater agreement for full-text screening was high (98.9%;  $k > 0.96$ ).

We extracted and recorded authors and publication date; total sample size; demographic characteristics of participants (i.e., age, sex and/or gender [which are different but not always distinguishable in published research], race and/or ethnicity, nationality [if information on race/ethnicity was unavailable]); study design and setting; characteristics of paternal anxiety measure; and characteristics of offspring outcomes assessed and measures used.

Our outcome was offspring emotional and behavioural problems. The following continuous moderators were coded: offspring age at the assessment of their behavioural/emotional outcomes (in months), offspring sex (% females), time lag between father and offspring assessment, and publication year of the study. The following categorical moderators were coded: type of assessment of offspring outcomes (coded as diagnostic interview vs nondiagnostic interview); informant of offspring outcomes (coded as self-report, clinician/specialist, parent, mother, father, teacher, and combined raters); type of assessment of paternal anxiety (coded as diagnostic interview vs nondiagnostic interview); association type (cross-sectional vs prospective longitudinal); geographical location (i.e., continent where the

research was conducted); father-offspring biological relatedness (birth fathers only, adoptive fathers only, majority birth fathers, not stated); and risk level of the paternal sample. Positive offspring outcomes (i.e., prosocial behaviour, self-esteem, self-efficacy, wellbeing, socioemotional development) were reverse-coded for the purpose of the meta-analysis.

The methodological quality of the studies included in the meta-analysis was evaluated with the Newcastle-Ottawa Scale for case-control and cohort studies (Wells et al., 2000), as recommended by the Cochrane Collaboration. Some items were irrelevant for some studies, so, for comparability, we calculated a mean score for each study. Double-rating of 25% of the studies was done; discrepancies were discussed and resolved by consensus, with input from P.J.L. if a consensus could not be reached.

### 2.2.2 Data Analysis

The meta-analysis was conducted using R Studio version 4.2.3 (Posit Team, 2023). Most of the included studies contributed multiple effect sizes, and the same sample was used by multiple studies, thus following a nested structure (Harrer et al., 2021). To model these dependencies in our data, we used the *Metafor* package (Viechtbauer, 2010) to fit meta-analytic random-effects three-level models via restricted maximum likelihood procedures (Cheung, 2014). We used the Akaike information criterion, Bayesian information criterion, and likelihood ratio test to assess whether the three-level model was superior (i.e., explained significantly more variance) to a reduced two-level model.

Most effect sizes were reported as Pearson product-moment correlation coefficients ( $r$ ); hence, Pearson  $r$  was chosen as the effect size indicator, and other effect sizes were transformed into a Pearson  $r$ . We did not pool regression coefficients in our meta-analysis. Indeed, regression coefficients extracted from (multiple) regression models are not directly comparable because studies are likely to have controlled for different covariates (Harrer et al., 2021). We interpreted effect sizes referring to calibrated guidelines specific to psychological research that account for the cumulative influence of small effects over time, where  $r = 0.05$  is

considered very small,  $r = 0.10$  is small,  $r = 0.20$  is medium,  $r = 0.30$  is large, and  $r > 0.40$  is considered a very large effect (Funder & Ozer, 2019). To prevent the introduction of bias in the estimation of the standard error for studies with a small sample size, we transformed Pearson  $r$  values to Fisher  $z$  scores for analyses (Alexander, Scozzaro, & Borodkin, 1989); we reported  $z$  scores in the forest plots, while values reported in the text were converted back to Pearson  $r$  for ease of interpretation. Meta-regressions were conducted to examine moderating effects if a minimum of 10 effect sizes were available (Schwarzer, Carpenter, & Rücker, 2015).

The  $I^2$  statistic was used to assess heterogeneity, and the values were interpreted in relation to identified thresholds (low = 25%, moderate = 50%, high = 70%; Higgins, Thompson, Deeks, & Altman, 2003). Because we used a three-level meta-analytic model, the heterogeneity variance was split into two parts: one quantifying the percentage of total variation associated with true effect size differences within clusters (i.e., within samples), the other attributable to true effect size differences between cluster (i.e., between samples) variations (Cheung, 2014; Harrer et al., 2021). We conducted leave-one-out sensitivity analyses (Viechtbauer, 2010). Publication bias was assessed via visual inspection of funnel plots and using a proxy for the Egger test (Egger, Davey Smith, Schneider, & Minder, 1997) by conducting a three-level meta-analysis with the standard error of each effect size as a moderator (Rodgers & Pustejovsky, 2021).

## 2.3 Results

We screened  $k = 6,466$  abstracts, assessed  $k = 1,137$  full texts, and included  $k = 155$  papers (see Figure 2.1 for PRISMA flowchart). We contacted  $k = 103$  authors because effect sizes were incalculable from information in the records. Data to run a meta-analysis were unavailable for  $k = 57$  studies. Thus, the current meta-analysis included  $k = 98$  studies, derived from  $k = 83$  independent samples, yielding  $k = 322$  effect sizes, comprising 54,998 participants. A list of the records excluded from this meta-analysis, with reasons, is included in Appendix C, section C.2.

The characteristics of the included studies are summarised in Table 2.1. Based on the information available in the included studies, we were able to tease apart specific offspring outcomes and create four subgroups of offspring outcomes, conducting five partially overlapping meta-analyses examining the associations between paternal anxiety and offspring combined emotional and behavioural, behavioural only, emotional only, anxiety only, and depression only outcomes. We were unable to disaggregate different types of behavioural outcomes due to the relatively small number of studies measuring these and the heterogeneity within this subgroup. See Figure C1, in Appendix C, for a visual representation of the outcomes examined in the five meta-analyses. Quality ratings for the  $k = 98$  included studies are summarised in Table 2.1.

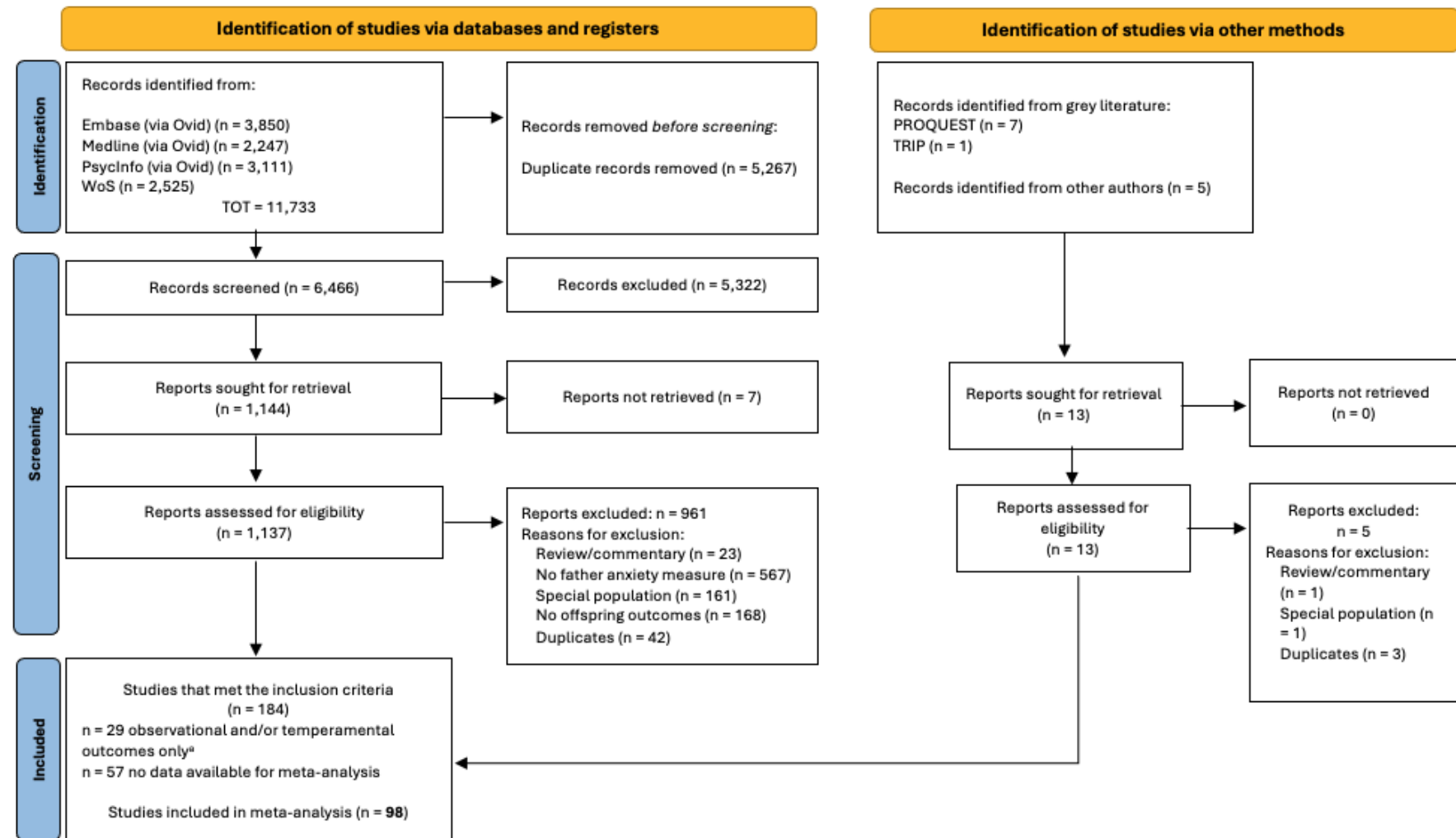


Figure 2.1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram

Note. WoS = Web of Science. <sup>a</sup> Not included in the present report.

Table 2.1 Summary of Characteristics of Studies Included in the Meta-analyses

| Sample                                           | Study (year)                                                  | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                                            | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (% females) | Offspring age at assess-ment (mo) | Method of paternal anxiety assess-ment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>c</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|--------------------------------------------------|---------------------------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| Adams and Sarason                                | Adams and Sarason (1963) <sup>g</sup>                         | 132 | Not reported                                                                                                                      | North America  | Non-high risk                            | 45.45                             | 210                               | Sx                                                  | Anx                                     | Sx (TAS, NAS, LPS, MAS)                                  | 0                          | not stated                              | 0.43                            |
| EGDS                                             | Ahmadzadeh et al. (2019)                                      | 263 | Parents: White (>90)                                                                                                              | North America  | Non-high risk                            | -                                 | 72; 84; 96                        | Sx                                                  | Anx                                     | Sx (CBCL)                                                | 1; 2                       | no                                      | 0.75                            |
|                                                  | Chen et al. (2020)                                            | 561 | Fathers: African American (4-5); Latino (2); multiracial (1); other or unknown or not reported (2); White (90-92);                | North America  | Non-high risk                            | 43                                | 54; 132                           | Sx                                                  | Ep                                      | Sx (CBCL)                                                | 3                          | no                                      | 0.75                            |
|                                                  | Natsuaki et al. (2013)                                        | 269 | Parents: White (>90)                                                                                                              | North America  | Non-high risk                            | 43                                | 18; 27                            | Sx                                                  | Anx                                     | Sx (CBCL)                                                | 1; 2                       | no                                      | 0.88                            |
| Aktar et al.                                     | Aktar, Van Bockstaele, Perez-Edgar, Wiers, and Bogels (2019b) | 89  | Fathers: Dutch (96.59)                                                                                                            | Europe         | Non-high risk                            | 52.81                             | 54; 90.24                         | Sx                                                  |                                         | Dx, Sx (ADIS-C, SCARED)                                  | 3                          | not stated                              | 0.75                            |
| Alsmeier and Schulz Flourishing Families Project | Alsmeier and Schulz (2020) <sup>h</sup>                       | 74  | Fathers: German (100)                                                                                                             | Europe         | Non-high risk                            | -                                 | 174                               | Sx                                                  | Ep, Bp                                  | Sx (CBCL)                                                | 0; 1; 2                    | not stated                              | 0.75                            |
|                                                  | Apsley and Padilla-Walker (2020)                              | 338 | Families: African American (11); Asian American (<1); European American (60); combination of two or more ethnicities among family | North America  | Non-high risk                            | 52                                | 171.84; 219.84                    | Sx                                                  | Anx, Dep                                | Sx (SCAI, CESD)                                          | 0                          | not stated                              | 0.75                            |

# Chapter 2

| Sample | Study (year)             | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                                     | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (%) females) | Offspring age at assess-ment (mo) | Method of paternal anxiety assess-ment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|--------|--------------------------|-----|----------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|------------------------------------|-----------------------------------|-----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| SECCYD | Gibbons (2021)           | 457 | members (18); Hispanic (<1)<br>Families: African American (11.52); European American (64.78); other or multiethnic (19.78) | North America  | Non-high risk                            | 51.89                              | 159.84; 171.48; 183.48; 192; 204  | Sx                                                  | Anx                                     | Sx (SCAI)                                                | 0                          | not stated                              | 0.75                            |
|        | Bailey and Marker (2021) | 707 | Fathers: African American (14); American Indian (0.4); Asian/Pacific Islander (1.9); European American (81.5); other (2.1) | North America  | Non-high risk                            | 48.30                              | 72; 96; 120; 132; 180             | Sx                                                  | Ep, Bp                                  | Sx (CBCL)                                                | 1; 2                       | not stated                              | 0.75                            |
|        | Keizer (2012)            | 724 | Offspring: Asian/Pacific Islander (<2); Black/African American (13); White (80); other (5)                                 | North America  | Non-high risk                            | 64.29                              | 144; 180                          | Sx                                                  | Anx                                     | Sx (CBCL)                                                | 3                          | not stated                              | 0.75                            |
|        | Marker and Bailey (2022) | 773 | Fathers: African American (14); American Indian (0.4); Asian/Pacific Islander (1.9); European American                     | North America  | Non-high risk                            | 48.30                              | 72                                | Sx                                                  | Ep, Bp                                  | Sx (CBCL)                                                | 3                          | not stated                              | 0.75                            |

| Sample                | Study (year)                            | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                                   | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gender (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|-----------------------|-----------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
|                       | Mathews (2021)                          | 635 | (81.5); other (2.1)<br>not reported                                                                                      | North America  | Non-high risk                            | 100                              | 100.56; 111.36; 121.44           | Sx                                                 | Anx                                     | Sx (CBCL)                                                | 1                          | not stated                              | 0.75                            |
|                       | Parrigon and Kerns (2016)               | 661 | Offspring: White (90.8)                                                                                                  | North America  | Non-high risk                            | 49.18                            | 72; 180                          | Sx                                                 | Anx                                     | Sx (CBCL, YSR)                                           | 0; 2                       | majority yes                            | 0.75                            |
|                       | Partain, Nelson, and Hafiz (2022)       | 554 | Offspring: African American (10.6); Asian or Pacific Islander (1.3); other (4.7); White (83.4). Hispanic ethnicity (6.3) | North America  | Non-high risk                            | 49.40                            | 85.44                            | Sx                                                 | Bp                                      | Sx (CBCL, TRF)                                           | 5                          | not stated                              | 0.75                            |
|                       | Ranney, Behar, and Zinsser (2021)       | 674 | Offspring: African American (11.8); Asian or Pacific Islander (1.4); other (4.9); White (81.7); not reported (0.2)       | North America  | Non-high risk                            | 50.11                            | 84; 180                          | Sx                                                 | Ep                                      | Sx (YSR)                                                 | 0                          | majority yes                            | 0.75                            |
| Bögels et al.         | Bögels, Stevens, and Majdandzic (2011)  | 99  | Fathers: Dutch (92)                                                                                                      | Europe         | Non-high risk                            | 56.94                            | 124.8                            | Sx                                                 | Anx                                     | Sx (SPAI-C)                                              | 0                          | not stated                              | 0.43                            |
| Bögels and van Melick | Bögels and van Melick (2004)            | 75  | not reported                                                                                                             | Europe         | Non-high risk                            | 46.67                            | 123.6                            | Sx                                                 | Anx                                     | Sx (SCARED)                                              | 0; 1; 2; 5                 | yes                                     | 0.57                            |
| Borelli et al.        | Borelli, Margolin, and Rasmussen (2015) | 102 | Offspring: African-American/Black (18.6); Asian/Pacific                                                                  | North America  | Non-high risk                            | 40.20                            | 119.4                            | Sx                                                 | Anx                                     | Sx (STAIC trait)                                         | 0                          | not stated                              | 0.75                            |

| Sample                        | Study (year)                           | N    | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                                                        | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (%) females) | Offspring age at assess-ment (mo) | Method of paternal anxiety assess-ment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|-------------------------------|----------------------------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|------------------------------------|-----------------------------------|-----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| 3D pregnancy cohort<br>ALSPAC | Caccese et al. (2020)                  | 58   | Islander (7.8); other or mixed (19.5); White (53.9).<br>Hispanic/Latino (37.3); Non-Hispanic (62.7)                                           | Canada         | Non-high risk                            | 40.98                              | 79.89                             | Sx                                                  | Bp                                      | Sx (SDQ)                                                 | 3                          | yes                                     | 0.75                            |
|                               | Capron et al. (2015)                   | 3181 | Partners (fathers): White (98); other than White (2)                                                                                          | Europe         | Non-high risk                            | 56.20                              | 216                               | Sx                                                  | Anx                                     | Dx (CIS-R)                                               | 0                          | not stated                              | 0.71                            |
|                               | Van Batenburg-Eddes et al. (2013)      | 3442 | Partners (fathers): White (99)                                                                                                                | Europe         | Non-high risk                            | 48                                 | 48                                | Sx                                                  | Ep, Bp                                  | Sx (SDQ)                                                 | 1                          | not stated                              | 0.71                            |
| Generation R                  | Van Batenburg-Eddes et al. (2013)      | 2280 | Partners (fathers): Dutch or other-European (70); Cape Verdian (2); Dutch Antilles (3); Moroccan (4); Surinamese (6); Turkish (6); others (2) | Europe         | Non-high risk                            | 51                                 | 37.2                              | Sx                                                  | Ep, Bp                                  | Sx (CBCL)                                                | 1                          | not stated                              | 0.71                            |
| Cimino et al.                 | Cents et al. (2011)                    | 687  | Families: Dutch (100)                                                                                                                         | Europe         | Non-high risk                            | 51.40                              | 36.3                              | Dx                                                  | Ep, Bp                                  | Sx (CBCL)                                                | 1                          | yes                                     | 0.88                            |
|                               | Cimino, Cerniglia, and Paciello (2015) | 80   | Fathers: White (100)                                                                                                                          | Europe         | Mix                                      | -                                  | 27.6; 61.2                        | Sx                                                  | Ep, Bp                                  | Sx (CBCL)                                                | 3                          | yes                                     | 0.56                            |
|                               | Cimino, Cerniglia,                     | 64   | Fathers: White (100)                                                                                                                          | Europe         | Mix                                      | 50                                 | 28.8; 63.6; 91.2                  | Sx                                                  | Ep, Bp                                  | Sx (CBCL)                                                | 3                          | yes                                     | 0.56                            |

| Sample          | Study (year)                                         | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                                                                        | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|-----------------|------------------------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|-----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| CEDAR           | Paciello, and Sinesi (2013)                          | 344 | not reported                                                                                                                                                  | North America  | High-risk                                | -                                 | -                                | Dx                                                 | Anx                                     | Dx (K-SADS)                                              | 5                          | yes                                     | 0.78                            |
|                 | Clark et al. (1997)                                  | 344 | Families (high-risk): African American (30); European American (68); other (2). Families (low-risk): African American (19); European American (78); other (3) | North America  | High-risk                                | -                                 | -                                | Dx                                                 | Anx                                     | Dx (K-SADS)                                              | 5                          | yes                                     | 0.78                            |
| Coric et al.    | Clark, Cornelius, Wood, and Vanyukov (2004)          | 109 | not reported                                                                                                                                                  | Europe         | Non-high risk                            | 49.12                             | 132                              | Sx                                                 | Anx                                     | Sx (CDAS)                                                | 0                          | yes                                     | 0.29                            |
| Crego et al.    | Coric, Banozic, Klaric, Vukojevic, and Puljak (2014) | 88  | Offspring: the European Union (1.5); Latin America (9.0); Spaniards (85.2); other countries (2.7)                                                             | Europe         | Non-high risk                            | 55.20                             | 148.8                            | Sx                                                 | Anx                                     | Sx (MDAS)                                                | 0                          | not stated                              | 0.71                            |
| Dollberg et al. | Crego, Carrillo-Diaz, Armfield, and Romero (2013)    | 77  | not reported                                                                                                                                                  | Middle East    | Non-high risk                            | 55.13                             | 47.56                            | Sx                                                 | Ep, Bp                                  | Sx (CBCL)                                                | 1; 2                       | not stated                              | 0.57                            |
| Donnelly et al. | Dollberg, Gamliel, and Levy (2021)                   | 169 | Fathers: African American (1.4); Asian American (1.4); Hispanic                                                                                               | North America  | Non-high risk                            | 60.71                             | 219.6                            | Sx                                                 | Anx, Dep, General                       | Sx (MAS, BDI-II, RSES)                                   | 0                          | majority yes                            | 0.43                            |

| Sample                   | Study (year)                                                  | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                 | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gender (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|--------------------------|---------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| Dubois-Comtois et al.    | Dubois-Comtois, Pennestri, Bernier, Cyr, and Godbout (2019)   | 81  | (7.2); White (51.8)<br>Families: White (majority)                                                      | Canada         | High-risk                                | 52                               | 51                               | Sx                                                 | Bp                                      | Sx (CBCL)                                                | 3                          | not stated                              | 0.57                            |
| Dyba et al.              | Dyba, Moesgen, Klein, Pels, and Leyendecker (2019)            | 14  | Parents: German (95.6)                                                                                 | Europe         | High-risk                                | -                                | 75.12                            | Sx                                                 | Bp                                      | Sx (SDQ)                                                 | 3                          | majority yes                            | 0.44                            |
| Dyba et al.              | Dyba, Moesgen, Grimmig, Köhler, and Klein (2022) <sup>g</sup> | 15  | Families: German (88.5); other (11.5)                                                                  | Europe         | High-risk                                | -                                | -                                | Sx                                                 | Bp                                      | Sx (SDQ)                                                 | 3                          | majority yes                            | 0.44                            |
| Fernandez-Mendoza et al. | Fernandez-Mendoza et al. (2013)                               | 135 | not reported                                                                                           | Europe         | Non-high risk                            | 73.33                            | 242.4                            | Sx                                                 | Ep, Bp, Anx, Dep                        | Sx (FIRST, ISI, POMS, PSS)                               | 0                          | yes                                     | 0.57                            |
| Finsaas and Klein        | Finsaas and Klein (2022)                                      | 510 | Offspring: Asian (2.7); Black (8.2); White (88.7); Native American (0.0); other (0.0). Hispanic (12.4) | North America  | Non-high risk                            | 43.50                            | 111.6; 152.4                     | Sx                                                 | Anx, Dep                                | Dx (K-SADS)                                              | 4                          | not stated                              | 1                               |
| TOPP                     | Fjermestad, Nilsen, Johannessen, and Karevold (2017)          | 337 | Families: Norwegian (majority)                                                                         | Europe         | Non-high risk                            | 56.10                            | 174                              | Sx                                                 | Anx                                     | Sx (CPNI)                                                | 0; 1; 2                    | not stated                              | 0.57                            |
| Fliek et al.             | Fliek, Dibbets, Roelofs, and Muris (2017)                     | 117 | Offspring: Dutch (100)                                                                                 | Europe         | Non-high risk                            | 48.84                            | 114.24                           | Sx                                                 | Anx                                     | Sx (SCARED)                                              | 0                          | majority yes                            | 0.57                            |

| Sample             | Study (year)                                 | N        | Reported racial or ethnic identities or nationalities (%) <sup>a</sup> | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|--------------------|----------------------------------------------|----------|------------------------------------------------------------------------|----------------|------------------------------------------|-----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| Fliek et al.       | Fliek, Daemen, Roelofs, and Muris (2015)     | 97       | not reported                                                           | Europe         | Non-high risk                            | 41.90                             | 51.24                            | Sx                                                 | Anx                                     | Sx (PAS)                                                 | 2                          | majority yes                            | 0.57                            |
| VTSABD             | Foley et al. (2001)                          | 850      | Parents: White (majority)                                              | North America  | Mix                                      | -                                 | -                                | Dx                                                 | Anx                                     | Dx (CAPA-C)                                              | 4                          | yes                                     | 1                               |
| Forresi et al.     | Forresi et al. (2020)                        | 193      | Offspring: Italian (94.7)                                              | Europe         | Non-high risk                            | 49                                | 132                              | Sx                                                 | General, Bp, Ep                         | Sx (SDQ)                                                 | 0                          | not stated                              | 0.33                            |
|                    | Forresi et al. (2021)                        | 193      | not reported                                                           | Europe         | Non-high risk                            | 47.40                             | 135.12                           | Sx                                                 | Ep                                      | Sx (PTSD-RI)                                             | 0                          | not stated                              | 0.56                            |
| Freedman-Doan      | Freedman-Doan (1994)                         | 97       | Offspring: White (majority)                                            | North America  | Non-high risk                            | 46.10                             | 108; 120                         | Sx                                                 | Anx                                     | Sx ( <i>ad hoc</i> questions)                            | 0                          | not stated                              | 0.75                            |
| Gamliel et al.     | Gamliel, Dollberg, and Levy (2018)           | 60       | Families: Israeli (100)                                                | Middle East    | Non-high risk                            | 46.67                             | 47.52                            | Sx                                                 | Ep, Bp                                  | Sx (CBCL)                                                | 1; 2                       | yes                                     | 0.57                            |
| Hajal et al.       | Hajal et al. (2020)                          | 104      | not reported                                                           | North America  | High-risk                                | 52.90                             | 51.56                            | Sx                                                 | General, Bp, Anx                        | Sx (SCAS, ECBI)                                          | 3                          | not stated                              | 0.71                            |
| Harold et al.      | Harold, Elam, Lewis, Rice, and Thapar (2012) | 436, 170 | not reported                                                           | Europe         | Non-high risk                            | 52.90                             | 80.64                            | Sx                                                 | Bp                                      | Sx (SDQ, DSM)                                            | 1                          | <i>n</i> = 436 yes, <i>n</i> = 170 no   | 0.71                            |
| Hastings et al.    | Hastings et al. (2021)                       | 220      | Families: White/European American (71)                                 | North America  | Non-high risk                            | 49.55                             | 164.04; 328.92                   | Sx                                                 | Anx, Dep                                | Sx (STAIC-trait, DACL)                                   | 0                          | majority yes                            | 0.63                            |
| Hughes and Gullone | Hughes and Gullone (2010a)                   | 148      | Fathers: Australian (74)                                               | Australia      | Non-high risk                            | 56                                | 188.4                            | Sx                                                 | Ep                                      | Sx (RADS+RCMAS, CBCL)                                    | 0; 1; 2                    | majority yes                            | 0.57                            |
| Hughes and Gullone | Hughes and Gullone (2010b)                   | 124      | Fathers: Australian (73)                                               | Australia      | Non-high risk                            | 59.89                             | 194.4                            | Sx                                                 | Ep, Anx, Dep                            | Sx (RADS, RCMAS, CBCL)                                   | 0; 1; 2                    | majority yes                            | 0.75                            |
| OCC                | Hulgaard et al. (2021)                       | 621      | not reported                                                           | Europe         | Non-high risk                            | 47.40                             | 98.4                             | Sx                                                 | Anx                                     | Sx (CIAS)                                                | 0                          | not stated                              | 0.75                            |
| Johnson            | Johnson (2012)                               | 552      | Offspring: African American (2); Hispanic (6);                         | North America  | Non-high risk                            | 52                                | 142.8                            | Sx                                                 | Anx, Dep                                | Sx (YSR)                                                 | 0                          | majority yes                            | 0.75                            |

| Sample        | Study (year)                            | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                                                                                                | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|---------------|-----------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|-----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| Kelley et al. | Kelley et al. (2017)                    | 97  | White (88); other (4)<br>Fathers: African-American (22.68); American Indian or Alaskan Native (4.12); Asian (0); Hispanic or Latino (7.22); multicultural/other (7.22); White (58.76) | North America  | High-risk                                | 48.96                             | 131.64                           | Sx                                                 | Ep                                      | Sx (CBCL)                                                | 1; 2                       | not stated                              | 0.71                            |
| Kins et al.   | Kins, Soenens, and Beyers (2013)        | 119 | Families: Belgian (100)                                                                                                                                                               | Europe         | Non-high risk                            | 44                                | 300                              | Sx                                                 | Anx                                     | Sx (PASAS)                                               | 0                          | yes                                     | 0.57                            |
| Kujawa et al. | Kujawa, Glenn, Hajcak, and Klein (2015) | 144 | Offspring: Hispanic (13.2). African American (4.9); Asian (2.1); Native American (0.7); White (92.4)                                                                                  | North America  | Non-high risk                            | 43.10                             | 110.04                           | Dx                                                 | Anx, Dep                                | Sx (SCARED, CDI)                                         | 3                          | yes                                     | 1                               |
|               | Kujawa, Proudfit, and Klein (2014)      | 407 | Offspring: Hispanic (11.1). African American (7.6); Asian (2.7); White (89.7)                                                                                                         | North America  | Non-high risk                            | 45                                | 110.16                           | Dx                                                 | Anx, Dep                                | Dx (K-SADS)                                              | 5                          | yes                                     | 0.86                            |
| Lara et al.   | Lara, Crego, and Romero-Maroto (2012)   | 183 | not reported                                                                                                                                                                          | Europe         | Non-high risk                            | 48.60                             | 112.56                           | Sx                                                 | Anx                                     | Sx (CFSS-DS)                                             | 0                          | not stated                              | 0.57                            |

| Sample           | Study (year)                                                    | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>             | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gender (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|------------------|-----------------------------------------------------------------|-----|------------------------------------------------------------------------------------|----------------|------------------------------------------|----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| Lee et al.       | Lee, Ward, Chang, and Downing (2021)                            | 126 | Parents: Black (10.9); Hispanic (10.4); White (70.9); other (7.9)                  | North America  | Non-high risk                            | -                                | -                                | Sx                                                 | Anx                                     | Sx (CBCL)                                                | 3                          | not stated                              | 0.57                            |
| Leve et al.      | Leve et al. (2009) <sup>i</sup>                                 | 95  | not reported                                                                       | North America  | Non-high risk                            | 43.20                            | 18                               | Sx                                                 | Bp                                      | Sx (CBCL)                                                | 1                          | yes                                     | 0.71                            |
| Liu et al.       | Liu, Li, Zheng, and Wang (2021)                                 | 477 | Families: Chinese (100)                                                            | Asia           | Non-high risk                            | 40.88                            | 100.56                           | Sx                                                 | Anx                                     | Sx (SCAS-P)                                              | 3                          | not stated                              | 0.71                            |
| NDIT             | Low et al. (2012)                                               | 454 | Offspring: Canadian (95.8)                                                         | Canada         | Non-high risk                            | 53                               | 244.8                            | Sx                                                 | Anx                                     | Sx, Dx ( <i>ad hoc</i> question, CIDI)                   | 0                          | majority yes                            | 0.75                            |
| Ma et al.        | Ma, Liu, Wang, and Wang (2016) <sup>h</sup>                     | 531 | not reported                                                                       | Asia           | Non-high risk                            | 49.72                            | -                                | Sx                                                 | Anx                                     | Sx (SCAS-P)                                              | 2                          | not stated                              | 0.57                            |
| Mackinaw-Koons   | Mackinaw-Koons (2001)                                           | 97  | Offspring: African-American (2); Asian (2); biracial (3); Hispanic (2); White (90) | North America  | Non-high risk                            | 67.94                            | 176.4                            | Sx                                                 | Anx                                     | Sx (RCMAS)                                               | 0; 1; 2                    | majority yes                            | 0.57                            |
| Mann and Sanders | Mann and Sanders (1994)                                         | 40  | not reported                                                                       | North America  | Non-high risk                            | 0                                | 116.4                            | Sx                                                 | Ep                                      | Sx (CPAS)                                                | 0                          | yes                                     | 0.71                            |
| Mazaheri et al.  | Mazaheri, Ghasemzadeh, Saadat, Karami, and Pourshahriari (2011) | 220 | not reported                                                                       | Middle East    | Non-high risk                            | 50                               | -                                | Sx                                                 | General, Ep                             | Sx (SEQ-C)                                               | 0                          | not stated                              | 0.29                            |
| MUSP             | McClure, Brennan, Hammen, and                                   | 522 | Families: Aboriginal (2.1); Asian (4.3);                                           | Australia      | High-risk                                | 49.26                            | 180                              | Dx                                                 | Anx                                     | Dx (K-SADS)                                              | 5                          | majority yes                            | 1                               |

| Sample               | Study (year)                                     | N                                                    | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                   | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|----------------------|--------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|-----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
|                      | Le Brocque (2001)                                |                                                      | Australian White (91.4); Maori/Islander (2.2)                                                            |                |                                          |                                   |                                  |                                                    |                                         |                                                          |                            |                                         |                                 |
| VETR                 | McCutcheon et al. (2013)                         | 488                                                  | Offspring: Non-White (13); White (87)                                                                    | North America  | Non-high risk                            | 48.50                             | 272.4                            | Dx                                                 | Anx                                     | Dx (SSAGA)                                               | 4                          | yes                                     | 1                               |
|                      | Xian et al. (2010)                               | 942                                                  | Fathers: White (93.5)                                                                                    | North America  | High-risk                                | 50.10                             | 256.8                            | Dx                                                 | Bp                                      | Sx (FTND)                                                | 0                          | majority yes                            | 0.86                            |
| Medeiros et al.      | Medeiros, Gouveia, Canavarro, and Moreira (2016) | 243                                                  | not reported                                                                                             | Europe         | Non-high risk                            | 57.20                             | 147.24                           | Sx                                                 | General                                 | Sx (KIDSCREEN-10)                                        | 0                          | not stated                              | 0.71                            |
| Milgram and Toubiana | Milgram and Toubiana (1999) <sup>g</sup>         | 354                                                  | not reported                                                                                             | Middle East    | Non-high risk                            | 52.82                             | -                                | Sx                                                 | Anx                                     | Sx (AAS)                                                 | 0                          | not stated                              | 0.57                            |
| Mohammadi et al.     | Mohammadi et al. (2020)                          | 29541                                                | Offspring: Iranian (100)                                                                                 | Middle East    | Non-high risk                            | 51.10                             | 141.6                            | Dx                                                 | Anx                                     | Dx (S-SADS)                                              | 4                          | yes                                     | 1                               |
| Nikolic et al.       | Nikolic, de Vente, Colonnese, and Bogels (2016)  | <i>n</i> = 44 high-risk, <i>n</i> = 61 non-high risk | Parents: White (93)                                                                                      | Europe         | High-risk and Non-high risk              | 50.91                             | 53.26                            | Sx                                                 | Anx                                     | Sx (PAS)                                                 | 3                          | not stated                              | 1                               |
| Olak et al.          | Olak et al. (2013)                               | 344                                                  | not reported                                                                                             | Europe         | Non-high risk                            | 45.35                             | 111.6                            | Sx                                                 | Anx                                     | Sx (CFSS-DS)                                             | 0                          | not stated                              | 0.57                            |
| FORBOW project       | Pavlova et al. (2022)                            | 299                                                  | Offspring: White (88.4); other (African, Chinese, East Indian, Inuit, Mi'kmaq, Métis, multiracial, 11.6) | Canada         | Mix                                      | 50.20                             | 128.4                            | Dx                                                 | Anx                                     | Dx (K-SADS, SCID-5)                                      | 4                          | yes                                     | 1                               |

| Sample             | Study (year)                                       | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                                          | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (%) females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|--------------------|----------------------------------------------------|-----|---------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|------------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| Peleg et al.       | Peleg, Miller, and Yitzhak (2015)                  | 88  | Families: Israeli Jewish (100)                                                                                                  | Middle East    | Non-high risk                            | 46.60                              | 158.64                           | Sx                                                 | Anx                                     | Sx (SAT)                                                 | 0                          | yes                                     | 0.57                            |
| Pemble             | Pemble (2006)                                      | 50  | Families: African American (12); Asian (2); Native American (2); White (84)                                                     | North America  | Non-high risk                            | 56                                 | 84.24                            | Sx                                                 | Ep                                      | Sx (CBCL)                                                | 1                          | yes                                     | 0.86                            |
| Pickersgill et al. | Pickersgill, Valentine, Pincus, and Foustok (1999) | 27  | not reported                                                                                                                    | Europe         | Non-high risk                            | 100                                | -                                | Sx                                                 | Anx                                     | Sx (FSS)                                                 | 0                          | not stated                              | 0.43                            |
| Proyer and Neukom  | Proyer and Neukom (2013)                           | 160 | not reported                                                                                                                    | Europe         | Non-high risk                            | 49.73                              | 97.56                            | Sx                                                 | Anx                                     | Sx (PhoPhiKat-30c)                                       | 0                          | not stated                              | 0.71                            |
| Raouna et al.      | Raouna, Malcolm, Ibrahim, and MacBeth (2021)       | 21  | Fathers: British (90.48); other (9.52)                                                                                          | Europe         | High-risk                                | 57.10                              | 10.81                            | Sx                                                 | General                                 | Sx (ASQ:SE-2)                                            | 3                          | not stated                              | 0.50                            |
| Reitman and Asseff | Reitman and Asseff (2010)                          | 122 | Fathers: African American (7); Hispanic and Asian (<7); White (86)                                                              | North America  | Non-high risk                            | 54.50                              | 228                              | Sx                                                 | Anx                                     | Sx (STAIC-trait)                                         | 0                          | not stated                              | 0.57                            |
| Renk et al.        | Renk et al. (2007)                                 | 272 | Families: African American (12.9); Asian American (0.4); Latino/Latina (10.7); Native American (1.1); other (0.4); White (74.6) | North America  | Non-high risk                            | 47.79                              | 162.24                           | Sx                                                 | Ep, Bp                                  | Sx (YSR)                                                 | 0                          | yes                                     | 0.86                            |
| Riskind et al.     | Riskind, Sica, Bottesi, Ghisi,                     | 286 | Offspring: White (100)                                                                                                          | Europe         | Non-high risk                            | 43.20                              | 259.2                            | Sx                                                 | Anx                                     | Sx (PSWQ, BAI)                                           | 0                          | yes                                     | 0.57                            |

| Sample                     | Study (year)                                                                                     | N   | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>                                             | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|----------------------------|--------------------------------------------------------------------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------|-----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| CONFIA-20                  | and Kashdan (2017)<br>Romero, Lopez-Romero, Dominguez-alvarez, Villar, and Gomez-Fraguela (2020) | 102 | Parents: from Galicia, NW Spain (94.2); other Spanish regions (5.8)                                                | Europe         | Non-high risk                            | 50.40                             | 87.48                            | Sx                                                 | Ep, Bp                                  | Sx (SDQ)                                                 | 3                          | not stated                              | 0.71                            |
| Schick et al.              | Schick, Morina, Klaghofer, Schnyder, and Muller (2013)                                           | 51  | Families: Kosovar (100)                                                                                            | Europe         | High-risk                                | 66.67                             | 171.6                            | Sx                                                 | Ep, Anx, Dep                            | Sx (DIKJ, SCAS, UCLA)                                    | 0                          | not stated                              | 0.71                            |
| Schreier et al.            | Schreier and Heinrichs (2010)                                                                    | 336 | not reported                                                                                                       | Europe         | Non-high risk                            | 51                                | 150.96                           | Sx                                                 | Ep, Bp, Anx                             | Sx (SASC-R, SDQ)                                         | 0                          | not stated                              | 0.71                            |
| Sfeir et al.               | Sfeir, Haddad, Akel, Hallit, and Obeid (2021)                                                    | 401 | Parents: Lebanese (100)                                                                                            | Middle East    | Non-high risk                            | 57.10                             | 96.24                            | Sx                                                 | Bp                                      | Sx (PSQ)                                                 | 3                          | not stated                              | 0.43                            |
| Sica et al.                | Sica et al. (2013)                                                                               | 288 | Offspring: White (100)                                                                                             | Europe         | Non-high risk                            | 43.20                             | 259.2                            | Sx                                                 | Ep, Anx                                 | Sx (BAI, OBQ, OCI)                                       | 0                          | yes                                     | 0.71                            |
| Skoranski and Lunkenheimer | Skoranski and Lunkenheimer (2021)                                                                | 82  | Fathers: Asian (1); Black (2); Latinx (53); White (29); multiethnic (8); Native American (2); other or unknown (4) | North America  | Mix                                      | 47                                | 48                               | Sx                                                 | Ep, Bp                                  | Sx (CBCL)                                                | 1                          | not stated                              | 0.63                            |
| Tam et al.                 | Tam et al. (2017)                                                                                | 310 | Families: Chinese (100)                                                                                            | Asia           | Non-high risk                            | 53.30                             | 120.72                           | Sx                                                 | Dep                                     | Sx (HADS)                                                | 0                          | not stated                              | 0.71                            |
| CBS                        | Tambs (1991)                                                                                     | 814 | Families: Norwegian (100)                                                                                          | Europe         | Non-high risk                            | -                                 | -                                | Sx                                                 | Anx                                     | Sx (SCL-90)                                              | 0                          | not stated                              | 0.71                            |
| Tazouti et al.             | Tazouti, Portenseigne,                                                                           | 167 | not reported                                                                                                       | Europe         | Non-high risk                            | 52.69                             | 124.8                            | Sx                                                 | Anx                                     | Sx ( <i>ad hoc</i> measure)                              | 0                          | not stated                              | 0.71                            |

| Sample           | Study (year)                                                  | N    | Reported racial or ethnic identities or nationalities (%) <sup>a</sup>      | Study location | Risk level of father sample <sup>b</sup> | Offspring sex/gen-der (% females) | Offspring age at assessment (mo) | Method of paternal anxiety assessment <sup>c</sup> | Offspring outcome assessed <sup>d</sup> | Method of outcome assessment (measure used) <sup>e</sup> | Outcome rater <sup>e</sup> | Father-offspring biological relatedness | Quality assessment <sup>f</sup> |
|------------------|---------------------------------------------------------------|------|-----------------------------------------------------------------------------|----------------|------------------------------------------|-----------------------------------|----------------------------------|----------------------------------------------------|-----------------------------------------|----------------------------------------------------------|----------------------------|-----------------------------------------|---------------------------------|
| Trumello et al.  | and Luxembourgger (2018)<br>Trumello et al. (2021)            | 102  | Families: Italian (100)                                                     | Europe         | Non-high risk                            | 41                                | 102                              | Sx                                                 | Ep, Bp                                  | Sx (SDQ)                                                 | 2                          | not stated                              | 0.71                            |
| Wang and Zhou    | Wang and Zhou (2015)                                          | 119  | not reported                                                                | Asia           | Non-high risk                            | -                                 | -                                | Sx                                                 | Bp                                      | Sx (RCBC)                                                | 1; 2                       | not stated                              | 0.71                            |
| Welch            | Welch (1996)                                                  | 98   | Families: White (majority)                                                  | North America  | Mix                                      | 71.51                             | 182.4                            | Dx                                                 | Ep, Bp                                  | Sx (CBCL+TRF)                                            | 5                          | yes                                     | 0.75                            |
| CPAS             | Westrupp et al. (2021)                                        | 92   | Parents: Aboriginal or Torres Strait Islander (2); Australian (98)          | Australia      | Non-high risk                            | 48.60                             | 103.92                           | Sx                                                 | Anx, Dep                                | Sx (BSC, SMFQ)                                           | 3                          | not stated                              | 0.71                            |
| Woodhouse et al. | Woodhouse, Ramos-Marcuse, Ehrlich, Warner, and Cassidy (2010) | 189  | Families: Asian (10); Black/African American (14); Hispanic (3); White (73) | North America  | Non-high risk                            | 62.43                             | 198                              | Sx                                                 | Dep                                     | Sx (CDI)                                                 | 0                          | yes                                     | 0.86                            |
| Xing et al.      | Xing, Zhang, Shao, and Wang (2017)                            | 328  | Families: Chinese (100)                                                     | Asia           | Non-high risk                            | 50.60                             | 49.32                            | Sx                                                 | Ep                                      | Sx (CBQ-VSF)                                             | 1                          | not stated                              | 0.71                            |
| Youn et al.      | Youn et al. (2018)                                            | 158  | not reported                                                                | Asia           | Non-high risk                            | 46.80                             | 183.84                           | Sx                                                 | Bp                                      | Sx (SAS)                                                 | 0; 3                       | not stated                              | 0.29                            |
| Zhang et al.     | Zhang et al. (2022)                                           | 1514 | Families: Chinese (100)                                                     | Asia           | Non-high risk                            | 48.40                             | 169.2                            | Sx                                                 | Anx, Dep                                | Sx (GAD-7, PHQ-9)                                        | 0                          | not stated                              | 0.71                            |
| Zhao et al.      | Zhao et al. (2022)                                            | 595  | Families: Chinese (100)                                                     | Asia           | Non-high risk                            | 45.80                             | 54                               | Sx                                                 | Bp                                      | Sx (CSHQ)                                                | 3                          | not stated                              | 0.71                            |

*Note.* 3D pregnancy cohort = Design, Develop, Discover pregnancy cohort; AAS = Academic Anxiety Scale; ADIS-C = Anxiety Disorder Interview Schedule for child psychopathology; ALSPAC = Avon Longitudinal Study of Parents and Children study; ASQ:SE-2 = Ages and Stages Questionnaire: Social-Emotional, Second

Edition; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory—Second Edition; BSC = Brief Spence Children’s Anxiety Scale; CAPA-C = Child and Adolescent Psychiatric Assessment-Children’s Version; CBCL = Child Behaviour Checklist; CBQ-VSF = Child Behaviour Questionnaire - Very Short Form; CBS = Central Bureau of Statistics of Norway; CDAS = Corah Dental Anxiety Questionnaire; CDI = Children’s Depression Inventory; CEDAR = Centre for Education and Drug Abuse Research; CESD = Centre for Epidemiological Studies Depression Scale; CFSS-DS = Children’s Fear Survey Schedule-Dental Subscale; CIAS = Childhood Illness Attitude scales; CIDI = Composite International Diagnostic Interview; CIS-R = Clinical Interview Schedule Revised; CONFIA-20 = Confinement Effects on Families and Children study; CPAS = Children's Perceptual Alteration Scale; CPAS = COVID-19 Pandemic Adjustment Survey; CPNI = Coolidge Personality and Neuropsychological Inventory for Children; CSHQ = Children’s Sleep Habits Questionnaire; DACL = Depression Adjective Checklist; DIKJ = Depressionsinventar fur Kinder und Jugendliche; ECBI = Eyberg Child Behaviour Inventory; EGDS = Early Growth and Development Study; FIRST = Ford Insomnia Response to Stress Test; FORBOW project = Families Overcoming Risks and Building Opportunities for Well-being project; FSS = Fear Survey Schedule; FTND = Fagerström Test for Nicotine Dependence; GAD-7 = Generalized Anxiety Disorder-7; HADS = Hospital Anxiety and Depression Scale; ISI = Insomnia Severity Index; K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; LPS = Lack of Protection Scale; MAS = Manifest Anxiety Scale; MDAS = Modified Dental Anxiety Scale; MUSP = Mater-University Study of Pregnancy; NAS = Need for Achievement Scale; NDIT = Nicotine Dependence in Teens Study; OBQ = Obsessive Beliefs Questionnaire; OCC = Danish Odense Child Cohort; OCI = Obsessive Compulsive Inventory; PAS = Preschool Anxiety Scale; PASAS = Parents of Adolescents Separation Anxiety Scale; PHQ-9 = Patient Health Questionnaire-9; POMS = Depression and Anxiety scales of the Profile of Mood States; PSQ = Paediatric Sleep Questionnaire; PSS = Perceived Stress Scale; PSWQ = Penn State Worry Questionnaire; PTSD-RI = Post-traumatic Stress Disorder Reaction Index; RADS = Reynolds Adolescent Depression Scale; RCBC = Rutter’s Child Behaviour Checklist; RCMAS = Revised Children’s Manifest Anxiety Scale; RSES = Rosenberg Self-Esteem Scale; SAS = Smartphone Addiction Scale; SASC-R = Social Anxiety Scale for Children-Revised; SAT = Separation Anxiety Test; SCAI = Spence Child Anxiety Inventory; SCARED = Screen for Child Anxiety Related Emotional Disorders; SCAS = Spence Child Anxiety Scale; SCAS-P = Spence Children’s Anxiety Scale for Parents; SCID-5 = Structured Clinical Interview for DSM-5; SCL-90 = Symptom Checklist-90; SDQ = Strengths and Difficulties Questionnaire; SECCYD = Study of Early Child Care and Youth Development; SEQ-C = Self-Efficacy Questionnaire for Children; SMFQ = Short Mood and Feelings Questionnaire; SPAI-C = Social Phobia and Anxiety Inventory for Children; SSAGA = Semi-Structured Assessment for the Genetics of Alcoholism; STAIC = State-Trait Anxiety Inventory for Children; TAS = Test Anxiety Scale; TOPP = Tracking Opportunities and Problems in Childhood and Adolescence study; TRF = Teacher’s Report Form; UCLA = UCLA Posttraumatic Diagnostic Scale; VETR = Vietnam Era Twin Registry; VTSABD = Virginia Twin Study of Adolescent Behavioural Development surveys; YSR = Youth Self-Report.

<sup>a</sup>We tried to identify information on the race/ethnicity of the paternal sample, or, if unavailable, their nationality, as reported in the original research; if unavailable in the primary study, we reported information on parents, mothers, or offspring. For cohort studies, when the sociodemographic characteristics were not reported in the primary study, we tried to retrieve data from the general cohort description.

<sup>b</sup>The risk level of the paternal sample was coded as high risk for clinical or at-risk samples (e.g., samples drawn from war or earthquake zones), non-high risk for community samples, mix for samples drawn from both community and at-risk populations.

<sup>c</sup> The method of assessment was coded as symptom-based (sx) and diagnosis-based (dx).

<sup>d</sup> The offspring outcomes assessed were coded as General (i.e., general negative outcomes), emotional problems (Ep), behavioural problems (Bp), anxiety outcomes (Anx), and depression outcomes (Dep). Notably, anxiety and depression outcomes were included in the meta-analysis examining emotional outcomes.

<sup>e</sup> The raters of offspring outcomes were coded as: self-report (0), mother (1), father (2), both parents/unknown parent (3), expert (4), other (5).

<sup>f</sup> The quality assessment was based on the Newcastle-Ottawa Scale (NOS) for case-control and cohort studies. The item 'Demonstration that outcome of interest was not present at start of study' in the cohort studies checklist was considered irrelevant for our purposes and excluded from the assessment. Quality scores between 0.00-1.00 were generated from total scores in the NOS. Studies were generally highly rated in terms of comparability, adequacy of the assessment time of the outcomes (for cohort studies), method of ascertainment for cases and controls (for case-control studies). However, only in a minority of studies the assessment of exposure and of the outcomes was made via secure records or structured interviews, and in many studies there was no information regarding the representativeness of the sample.

<sup>g</sup> Paternal anxiety in this study refers to a retrospective self-report.

<sup>h</sup> Quality rating based on a translation to English.

<sup>i</sup> This study focused on the association between birth fathers' anxiety and adopted children's outcomes, hence 100% of the offspring sample had not been environmentally exposed to paternal anxiety.

### 2.3.1 Primary Results of Meta-analyses and Moderator Analyses

#### 2.3.1.1 Meta-analysis of Association Between Paternal Anxiety and Combined Emotional and Behavioural Offspring Outcomes

Emotional and behavioural problems were examined in a three-level meta-analysis drawn from 83 samples (322 effect sizes, 54,998 unique participants) and were positively associated with paternal anxiety ( $r = 0.16$ , 95% CI [0.13, 0.19],  $p < .0001$ ).  $I^2$  was 89.92%, with estimated variance components  $\tau^2_{\text{Level 3}} = 0.01$  and  $\tau^2_{\text{Level 2}} = 0.01$ , meaning that  $I^2_{\text{Level 3}} = 48.80\%$  of the total variation could be attributed to between-cluster heterogeneity and  $I^2_{\text{Level 2}} = 41.12\%$  to within-cluster heterogeneity. The three-level model provided a significantly better fit compared with a two-level model with level 3 heterogeneity constrained to zero ( $\chi^2_1 = 46.74$ ;  $p < .0001$ ).

The moderator analyses showed that the method of assessing offspring outcomes (i.e., diagnostic interview conducted by an expert vs questionnaires), the rater of the offspring outcomes, and the country where the study was conducted were significant moderators of the association between paternal anxiety and offspring general psychopathology (see Table C4, in Appendix C). Regarding the assessment methods, effects were significantly larger ( $r = 0.17$ ) when questionnaires were used to assess offspring outcomes and significantly smaller ( $r = 0.09$ ) when diagnostic interviews were used. Regarding the informants of offspring outcomes, associations were significantly stronger for father-rated outcomes ( $r = 0.27$ ), followed by parent-rated (i.e., both parents/unknown parent) outcomes ( $r = 0.20$ ); associations were significantly smaller for self-reported outcomes ( $r = 0.15$ ). Regarding the study location, effects were significantly stronger only for studies conducted in Australia ( $r = 0.21$ ); an especially large but nonsignificant effect emerged for studies conducted in Asia ( $r = 0.23$ ).

#### 2.3.1.2 Meta-analysis of Association Between Paternal Anxiety and Offspring Behavioural Outcomes

Behavioural problems in offspring, drawn from 27 samples (79 effect sizes and 10,958 unique participants) were significantly associated with paternal anxiety ( $r = 0.19$ , 95% CI [0.13,

0.24],  $p < .0001$ ).  $I^2$  was 90.37%, with estimated variance components  $\tau^2_{\text{Level 3}} = 0.01$  and  $\tau^2_{\text{Level 2}} = 0.01$ , meaning that  $I^2_{\text{Level 3}} = 29\%$  of the total variation could be attributed to between-cluster heterogeneity and  $I^2_{\text{Level 2}} = 61.37\%$  to within-cluster heterogeneity. The three-level model did not provide a significantly better fit compared with a two-level model with level 3 heterogeneity constrained to zero ( $\chi^2_1 = 1.11$ ,  $p = .29$ ). However, 52 of 79 of the effect sizes were not drawn from a unique sample; hence, we retained the nested model because it better represents the way our data were generated (Harrer et al., 2021).

The analyses of moderators revealed that the rater of offspring outcomes, the country where the study was conducted, and the year of publication of the study had a significant impact on the association between paternal anxiety and offspring behavioural outcomes (see Table C5, in Appendix C). Notably, we were unable to run meaningful moderator analyses for the method of assessment of paternal anxiety and offspring outcomes, for the father–offspring biological relatedness, and for the risk level of the paternal sample. Regarding the informants of offspring outcomes, effects were significantly larger when outcomes were rated by the father ( $r = 0.26$ ), followed by parent-rated outcomes ( $r = 0.23$ ); differences between effect sizes for father-rated and parent-rated outcomes were nonsignificant. Conversely, effects were significantly smaller when the informant of the outcomes was the mother ( $r = 0.12$ ). Regarding the study location, effects were significantly stronger for studies conducted in Asia ( $r = 0.27$ ) and significantly weaker for studies conducted in Canada and North America ( $r = 0.10$ ). Regarding the publication year, effects sizes were found to become stronger over time.

### **2.3.1.3 Meta-analysis of Association Between Paternal Anxiety and Offspring Emotional Outcomes**

Emotional outcomes in offspring were drawn from 71 samples (235 effect sizes, 52,327 unique participants) and were positively associated with paternal anxiety ( $r = 0.15$ , 95% CI [0.12, 0.18],  $p < .0001$ ).  $I^2$  was 89.90%, with estimated variance components  $\tau^2_{\text{Level 3}} = 0.01$  and  $\tau^2_{\text{Level 2}} = 0.01$ , meaning that  $I^2_{\text{Level 3}} = 47.91\%$  of the total variation could be attributed to between-cluster heterogeneity and  $I^2_{\text{Level 2}} = 41.99\%$  to within-cluster heterogeneity. The three-level model

provided a significantly better fit compared with a two-level model with level 3 heterogeneity constrained to zero ( $\chi^2_1 = 27.69, p < .0001$ ).

The method of assessing offspring outcomes (i.e., diagnostic interview conducted by an expert vs questionnaires) and the rater of the offspring outcomes were significant moderators of the association between paternal anxiety and offspring emotional symptoms (see Table C6, in Appendix C). Regarding the assessment method, effects were significantly larger ( $r = 0.16$ ) when questionnaires were used to assess offspring outcomes and significantly smaller ( $r = 0.08$ ) when diagnostic interviews were used. Regarding the informants of offspring outcomes, associations were significantly stronger for father-rated outcomes ( $r = 0.29$ ), followed by parent-rated outcomes ( $r = 0.20$ ); associations were significantly smaller when outcomes were self-reported ( $r = 0.14$ ).

#### **2.3.1.4 Meta-analysis of Association Between Paternal Anxiety and Offspring Anxiety Outcomes**

Anxiety in fathers and offspring was examined in 52 samples (124 effect sizes, 47,113 unique participants) and was significantly and positively associated with a small effect size ( $r = 0.13$ , 95% CI [0.11, 0.16],  $p < .0001$ ).  $I^2$  was 87.46%, with estimated variance components  $\tau^2_{\text{Level 3}} = 0.001$  and  $\tau^2_{\text{Level 2}} = 0.015$ , meaning that  $I^2_{\text{Level 3}} = 6.77\%$  of the total variation could be attributed to between-cluster heterogeneity and  $I^2_{\text{Level 2}} = 80.68\%$  to within-cluster heterogeneity. The three-level model did not provide a significantly better fit compared with a two-level model with level 3 heterogeneity constrained to zero ( $\chi^2_1 = 0.31, p = .58$ ), but we retained it following the same rationale as in the meta-analysis examining offspring behavioural outcomes (Harrer et al., 2021).

The analyses of moderators revealed that the method of assessing offspring outcomes (diagnostic interview conducted by an expert vs questionnaires) and the rater of the offspring outcomes had a significant impact on the association between paternal and offspring anxiety (see Table C7, in Appendix C). Notably, there were not enough studies to test the effect of the

risk level of the paternal sample. Regarding the impact of the assessment method, effects were significantly larger ( $r = 0.15$ ) when questionnaires were used to assess offspring outcomes and significantly smaller ( $r = 0.06$ ) when diagnostic interviews were used. Regarding the informants of offspring outcomes, associations were significantly stronger for father-rated outcomes ( $r = 0.25$ ), followed by parent-rated outcomes ( $r = 0.23$ ); associations were significantly smaller when outcomes were rated by the mother ( $r = 0.01$ ).

### **2.3.1.5 Meta-analysis of Association Between Paternal Anxiety and Offspring**

#### **Depression Outcomes**

Depression in offspring was examined in 13 samples (21 effect sizes, 4,502 unique participants) and was significantly positively associated with paternal anxiety with a small effect size ( $r = 0.13$ , 95% CI [0.03, 0.23],  $p = .01$ ).  $I^2$  was 88.55%, suggesting the presence of heterogeneity between studies. The estimated variance components were  $\tau^2_{\text{Level } 3} = 0.02$  and  $\tau^2_{\text{Level } 2} = 0.01$ , meaning that  $I^2_{\text{Level } 3} = 52.65\%$  of the total variation can be attributed to between-cluster heterogeneity and  $I^2_{\text{Level } 2} = 35.9\%$  to within-cluster heterogeneity. The three-level model did not provide a significantly better fit compared with a two-level model with level 3 heterogeneity constrained to zero ( $\chi^2_1 = 0.82$ ,  $p = .37$ ). However, due to the dependencies in our data, we kept the nested model (Harrer et al., 2021).

The analyses of moderators showed that only offspring sex had a significant impact on the association between paternal anxiety and offspring depression outcomes, as shown in Table C8 (Appendix C), with a stronger association between paternal anxiety and offspring depressive symptoms and disorders for female offspring. Notably, we could not test any categorical variables due to the small number of studies available for each subgroup.

We conducted leave-one-out sensitivity analyses for each meta-analysis. The pattern of significance remained identical except for depression outcomes, where the lowest value was nonsignificant ( $p = .05$ ). Results are reported in Table 2.2, together with a summary of the results of the five meta-analyses and their heterogeneity values ( $I^2$ ). Table 2.3 provides a general

overview of the results of the moderator analyses for the five meta-analyses. More details on our moderation analyses (with pairwise comparisons) are presented in Appendix C, section C.4.

Figure 2.2 through 2.6 show the forest plots for the five meta-analyses. Publication bias assessments are reported in Appendix C, section C.5.

The PRISMA checklist is provided in Appendix C, section C.6.

Table 2.2 Summary of Results of Meta-analyses and Sensitivity Analyses

| Offspring outcomes   | Effect sizes (k) | Studies (k) | Samples (k) | Sensitivity analyses <sup>a</sup> | Pooled <i>r</i> | 95% CI |      | <i>p</i> | <i>I</i> <sup>2</sup> % |
|----------------------|------------------|-------------|-------------|-----------------------------------|-----------------|--------|------|----------|-------------------------|
| All outcomes         | 322              | 98          | 83          |                                   | 0.16            | 0.13   | 0.19 | < .0001  | 89.92                   |
|                      |                  |             |             | Lowest                            | 0.15            | 0.12   | 0.18 | < .0001  | 50.49                   |
|                      |                  |             |             | Highest                           | 0.16            | 0.13   | 0.19 | < .0001  | 55.68                   |
| Behavioural outcomes | 79               | 30          | 27          |                                   | 0.19            | 0.13   | 0.24 | < .0001  | 90.37                   |
|                      |                  |             |             | Lowest                            | 0.17            | 0.13   | 0.20 | < .0001  | 0.001                   |
|                      |                  |             |             | Highest                           | 0.19            | 0.13   | 0.27 | < .0001  | 26.53                   |
| Emotional outcomes   | 235              | 84          | 71          |                                   | 0.15            | 0.12   | 0.18 | < .0001  | 89.9                    |
|                      |                  |             |             | Lowest                            | 0.14            | 0.11   | 0.17 | < .0001  | 32.69                   |
|                      |                  |             |             | Highest                           | 0.16            | 0.12   | 0.19 | < .0001  | 51.52                   |
| Anxiety outcomes     | 124              | 58          | 52          |                                   | 0.13            | 0.11   | 0.16 | < .0001  | 87.46                   |
|                      |                  |             |             | Lowest                            | 0.13            | 0.10   | 0.15 | < .0001  | 0.002                   |
|                      |                  |             |             | Highest                           | 0.14            | 0.11   | 0.17 | < .0001  | 0.05                    |
| Depression outcomes  | 21               | 14          | 13          |                                   | 0.13            | 0.03   | 0.23 | 0.01     | 88.55                   |
|                      |                  |             |             | Lowest                            | 0.08            | 0.00   | 0.16 | 0.05     | 0                       |
|                      |                  |             |             | Highest                           | 0.14            | 0.03   | 0.24 | 0.01     | 27.33                   |

*Note.* <sup>a</sup>The values refer to the lowest and highest effect sizes obtained in the leave-one-out sensitivity analyses. The sensitivity analyses were conducted for a meta-analysis of aggregated samples, as it is not possible to run leave-one-out analyses in three-level meta-analytic models.

Table 2.3 Summary of Results of Moderator Analyses

|                               | All emotional and behavioural outcomes |           |          |               |              |                   | Behavioural outcomes |           |          |                |              |                   |
|-------------------------------|----------------------------------------|-----------|----------|---------------|--------------|-------------------|----------------------|-----------|----------|----------------|--------------|-------------------|
|                               | <i>k</i>                               | <i>df</i> | <i>r</i> | 95% CI        | <i>F</i>     | <i>p</i>          | <i>k</i>             | <i>df</i> | <i>r</i> | 95% CI         | <i>F</i>     | <i>p</i>          |
| <b>Categorical moderators</b> |                                        |           |          |               |              |                   |                      |           |          |                |              |                   |
| Paternal anxiety assessment   |                                        |           |          |               | 3.18         | .08               |                      |           |          |                | –            | –                 |
| Diagnostic interview          | 21                                     | 320       | 0.09*    | [0.01, 0.17]  |              |                   | 5                    |           |          |                |              |                   |
| No diagnostic interview       | 301                                    | 320       | 0.17     | [-0.01, 0.16] |              |                   | 74                   |           |          |                |              |                   |
| Offspring assessment          |                                        |           |          |               | <b>4.57</b>  | <b>.03</b>        |                      |           |          |                | –            | –                 |
| Diagnostic interview          | 24                                     | 320       | 0.09*    | [0.01, 0.16]  |              |                   | 0                    |           |          |                |              |                   |
| No diagnostic interview       | 298                                    | 320       | 0.17*    | [0.01, 0.16]  |              |                   | 79                   |           |          |                |              |                   |
| Offspring outcome rater       |                                        |           |          |               | <b>23.58</b> | <b>&lt; .0001</b> |                      |           |          |                | <b>10.76</b> | <b>&lt; .0001</b> |
| Self-report                   | 111                                    | 316       | 0.15***  | [0.11, 0.18]  |              |                   | 9 <sup>a</sup>       |           |          |                |              |                   |
| Mother                        | 69                                     | 316       | 0.11     | [-0.08, 0.01] |              |                   | 26                   | 63        | 0.12***  | [0.06, 0.17]   |              |                   |
| Father                        | 59                                     | 316       | 0.27***  | [0.08, 0.18]  |              |                   | 21                   | 63        | 0.26***  | [0.08, 0.21]   |              |                   |
| Parents                       | 55                                     | 316       | 0.20*    | [0.00, 0.11]  |              |                   | 19                   | 63        | 0.23*    | [0.02, 0.20]   |              |                   |
| Expert                        | 15                                     | 316       | 0.07     | [-0.18, 0.03] |              |                   | 0 <sup>a</sup>       |           |          |                |              |                   |
| Other                         | 13                                     | 316       | 0.13     | [-0.10, 0.07] |              |                   | 4 <sup>a</sup>       |           |          |                |              |                   |
| Biological relatedness        |                                        |           |          |               | 0.60         | .62               |                      |           |          |                | –            | –                 |
| Yes                           | 63                                     | 318       | 0.14***  | [0.09, 0.19]  |              |                   | 21                   | 75        |          |                |              |                   |
| No                            | 29                                     | 318       | 0.13     | [-0.19, 0.16] |              |                   | 1                    | 75        |          |                |              |                   |
| Majority yes                  | 44                                     | 318       | 0.14     | [-0.08, 0.08] |              |                   | 3                    | 75        |          |                |              |                   |
| Not stated                    | 186                                    | 318       | 0.17     | [-0.03, 0.10] |              |                   | 54                   | 75        |          |                |              |                   |
| Study location                |                                        |           |          |               | <b>4.35</b>  | <b>.005</b>       |                      |           |          |                | <b>4.32</b>  | <b>.02</b>        |
| Australia                     | 13                                     | 318       | 0.21***  | [0.09, 0.32]  |              |                   | 0 <sup>a</sup>       |           |          |                |              |                   |
| Asia and Middle East          | 27                                     | 318       | 0.23     | [-0.12, 0.16] |              |                   | 10                   | 76        | 0.27***  | [0.16, 0.36]   |              |                   |
| Canada and North America      | 200                                    | 318       | 0.10     | [-0.24, 0.02] |              |                   | 46                   | 76        | 0.10*    | [-0.30, -0.04] |              |                   |
| Europe                        | 82                                     | 318       | 0.18     | [-0.16, 0.10] |              |                   | 23                   | 76        | 0.22     | [-0.18, 0.08]  |              |                   |
| Risk population               |                                        |           |          |               | 0.17         | .85               |                      |           |          |                | –            | –                 |
| High-risk                     | 17                                     | 319       | 0.18***  | [0.08, 0.27]  |              |                   | 5                    |           |          |                |              |                   |

|                              | All emotional and behavioural outcomes |           |          |               |          |          | Behavioural outcomes |           |          |                |             |            |
|------------------------------|----------------------------------------|-----------|----------|---------------|----------|----------|----------------------|-----------|----------|----------------|-------------|------------|
|                              | <i>k</i>                               | <i>df</i> | <i>r</i> | 95% CI        | <i>F</i> | <i>p</i> | <i>k</i>             | <i>df</i> | <i>r</i> | 95% CI         | <i>F</i>    | <i>p</i>   |
| Non-high risk                | 284                                    | 319       | 0.16     | [-0.12, 0.08] |          |          | 65                   |           |          |                |             |            |
| Mix                          | 21                                     | 319       | 0.18     | [-0.15, 0.16] |          |          | 9                    |           |          |                |             |            |
| Association type             |                                        |           |          |               | 0.35     | .55      |                      |           |          |                | 0.54        | .47        |
| Cross-sectional              | 216                                    | 320       | 0.16***  | [0.13, 0.19]  |          |          | 46                   | 77        | 0.19***  | [0.14, 0.25]   |             |            |
| Prospective                  | 106                                    | 320       | 0.15     | [-0.04, 0.02] |          |          | 33                   | 77        | 0.17     | [-0.10, 0.05]  |             |            |
| <b>Continuous moderators</b> |                                        |           |          |               |          |          |                      |           |          |                |             |            |
| <i>Intercept</i>             |                                        | 305       | 0.11***  | [0.06, 0.17]  |          |          |                      | 74        | 0.17**   | [0.07, 0.26]   |             |            |
| Offspring age at assessment  | 307                                    | 305       | 0.00     | [0.00, 0.00]  | 2.57     | .11      | 76                   | 74        | 0.00     | [0.00, 0.00]   | 0.24        | .63        |
| <i>Intercept</i>             |                                        | 279       | 0.17***  | [0.12, 0.22]  |          |          |                      | 68        | 0.15     | [-0.02, 0.31]  |             |            |
| Offspring sex                | 281                                    | 279       | 0.00     | [0.00, 0.00]  | 0.83     | .36      | 70                   | 68        | 0.00     | [0.00, 0.00]   | 0.53        | .47        |
| <i>Intercept</i>             |                                        | 320       | -0.98    | [-1.00, 1.00] |          |          |                      | 77        | -1.00*   | [-1.00, -0.96] |             |            |
| Year of publication          | 322                                    | 320       | 0.00     | [0.00, 0.00]  | 0.73     | .40      | 79                   | 77        | 0.01*    | [0.00, 0.02]   | <b>5.09</b> | <b>.03</b> |
| <i>Intercept</i>             |                                        | 320       | 0.16***  | [0.13, 0.19]  |          |          |                      | 77        | 0.19***  | [0.13, 0.24]   |             |            |
| Time lag                     | 322                                    | 320       | 0.00     | [-0.01, 0.01] | 0.04     | .84      | 79                   | 77        | 0        | [-0.01, 0.01]  | 0           | 1.00       |

Note. Boldface indicates significant *F* tests and their *p* values. Dashes are used to indicate that there were no adequate data to support the analyses for the specific moderator.

\**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

<sup>a</sup> Subgroup not included in the moderator analyses.

Table 2.3 Continued

|                               | Emotional outcomes |           |          |               |          |          | Anxiety outcomes |           |          |               |          |          | Depression outcomes |           |          |        |          |          |
|-------------------------------|--------------------|-----------|----------|---------------|----------|----------|------------------|-----------|----------|---------------|----------|----------|---------------------|-----------|----------|--------|----------|----------|
|                               | <i>k</i>           | <i>df</i> | <i>r</i> | 95% CI        | <i>F</i> | <i>p</i> | <i>k</i>         | <i>df</i> | <i>r</i> | 95% CI        | <i>F</i> | <i>p</i> | <i>k</i>            | <i>df</i> | <i>r</i> | 95% CI | <i>F</i> | <i>p</i> |
| <b>Categorical moderators</b> |                    |           |          |               |          |          |                  |           |          |               |          |          |                     |           |          |        |          |          |
| Paternal anxiety assessment   |                    |           |          |               | 3.37     | .07      |                  |           |          |               | 1.92     | .17      |                     |           |          |        | –        | –        |
| Diagnostic interview          | 16                 | 233       | 0.08     | [-0.01, 0.16] |          |          | 10               | 122       | 0.08     | [-0.01, 0.16] |          |          | 2                   |           |          |        |          |          |

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|                          | Emotional outcomes |           |          |               |              |                   | Anxiety outcomes |           |          |                |              |                   | Depression outcomes |           |          |        |          |          |
|--------------------------|--------------------|-----------|----------|---------------|--------------|-------------------|------------------|-----------|----------|----------------|--------------|-------------------|---------------------|-----------|----------|--------|----------|----------|
|                          | <i>k</i>           | <i>df</i> | <i>r</i> | 95% CI        | <i>F</i>     | <i>p</i>          | <i>k</i>         | <i>df</i> | <i>r</i> | 95% CI         | <i>F</i>     | <i>p</i>          | <i>k</i>            | <i>df</i> | <i>r</i> | 95% CI | <i>F</i> | <i>p</i> |
| No diagnostic interview  | 219                | 233       | 0.16     | [-0.01, 0.18] | <b>4.90</b>  | <b>.03</b>        | 114              | 122       | 0.14     | [-0.03, 0.16]  | <b>7.19</b>  | <b>.01</b>        | 19                  |           |          |        |          |          |
| Offspring assessment     |                    |           |          |               |              |                   |                  |           |          |                |              |                   |                     |           |          |        | –        | –        |
| Diagnostic interview     | 24                 | 233       | 0.08*    | [0.00, 0.15]  |              |                   | 21               | 122       | 0.06*    | [0.01, 0.12]   |              |                   | 3                   |           |          |        |          |          |
| No diagnostic interview  | 211                | 233       | 0.16*    | [0.01, 0.16]  | <b>24.50</b> | <b>&lt; .0001</b> | 103              | 122       | 0.15**   | [0.02, 0.15]   | <b>10.38</b> | <b>&lt; .0001</b> | 18                  |           |          |        |          |          |
| Offspring outcome rater  |                    |           |          |               |              |                   |                  |           |          |                |              |                   |                     |           |          |        | –        | –        |
| Self-report              | 96                 | 221       | 0.14***  | [0.11, 0.18]  |              |                   | 64               | 114       | 0.13***  | [0.10, 0.17]   |              |                   | 16                  |           |          |        |          |          |
| Mother                   | 43                 | 221       | 0.10     | [-0.10, 0.00] |              |                   | 15               | 114       | 0.01**   | [-0.20, -0.04] |              |                   | 0                   |           |          |        |          |          |
| Father                   | 38                 | 221       | 0.29***  | [0.10, 0.20]  |              |                   | 14               | 114       | 0.25**   | [0.03, 0.20]   |              |                   | 0                   |           |          |        |          |          |
| Parents                  | 34                 | 221       | 0.20     | [0.00, 0.12]  |              |                   | 13               | 114       | 0.23*    | [0.02, 0.18]   |              |                   | 2                   |           |          |        |          |          |
| Expert                   | 15                 | 221       | 0.06     | [-0.19, 0.02] |              |                   | 13               | 114       | 0.06     | [-0.16, 0.01]  |              |                   | 2                   |           |          |        |          |          |
| Other                    | 9 §                |           |          |               |              |                   | 5 <sup>a</sup>   |           |          |                |              |                   | 1                   |           |          |        |          |          |
| Biological relatedness   |                    |           |          |               | 0.33         | .80               |                  |           |          |                | 0.08         | .97               |                     |           |          |        | –        | –        |
| Yes                      | 42                 | 231       | 0.15***  | [0.09, 0.21]  |              |                   | 20               | 120       | 0.15***  | [0.08, 0.21]   |              |                   | 4                   |           |          |        |          |          |
| No                       | 28                 | 231       | 0.13     | [-0.24, 0.19] |              |                   | 16               | 120       | 0.14     | [-0.14, 0.14]  |              |                   | 0                   |           |          |        |          |          |
| Majority yes             | 40                 | 231       | 0.13     | [-0.11, 0.07] |              |                   | 21               | 120       | 0.12     | [-0.12, 0.08]  |              |                   | 9                   |           |          |        |          |          |
| Not stated               | 125                | 231       | 0.16     | [-0.06, 0.08] |              |                   | 67               | 120       | 0.13     | [-0.10, 0.07]  |              |                   | 8                   |           |          |        |          |          |
| Study location           |                    |           |          |               | 2.62         | .05               |                  |           |          |                | 0.69         | .41               |                     |           |          |        | –        | –        |
| Australia                | 13                 | 231       | 0.21***  | [0.09, 0.33]  |              |                   | 3 <sup>a</sup>   |           |          |                |              |                   | 2                   |           |          |        |          |          |
| Asia and Middle East     | 14                 | 231       | 0.20     | [-0.16, 0.14] |              |                   | 6 <sup>a</sup>   |           |          |                |              |                   | 2                   |           |          |        |          |          |
| Canada and North America | 152                | 231       | 0.10     | [-0.24, 0.02] |              |                   | 82               | 113       | 0.12***  | [0.08, 0.15]   |              |                   | 15                  |           |          |        |          |          |
| Europe                   | 56                 | 231       | 0.18     | [-0.16, 0.10] |              |                   | 33               | 113       | 0.14     | [-0.04, 0.09]  |              |                   | 2                   |           |          |        |          |          |
| Risk population          |                    |           |          |               | 0.65         | .53               |                  |           |          |                | –            | –                 |                     |           |          |        | –        | –        |
| High-risk                | 10                 | 232       | 0.15*    | [0.03, 0.27]  |              |                   | 6                |           |          |                |              |                   | 1                   |           |          |        |          |          |
| Non-high risk            | 213                | 232       | 0.15     | [-0.13, 0.12] |              |                   | 115              |           |          |                |              |                   | 20                  |           |          |        |          |          |
| Mix                      | 12                 | 232       | 0.22     | [-0.11, 0.23] |              |                   | 3                |           |          |                |              |                   | 0                   |           |          |        |          |          |
| Association type         |                    |           |          |               | 0.18         | .67               |                  |           |          |                | 0.40         | .53               |                     |           |          |        | –        | –        |
| Cross-sectional          | 162                | 233       | 0.15***  | [0.12, 0.19]  |              |                   | 100              | 122       | 0.14***  | [0.11, 0.17]   |              |                   | 15                  |           |          |        |          |          |
| Prospective              | 73                 | 233       | 0.14     | [-0.05, 0.03] |              |                   | 24               | 122       | 0.12     | [-0.09, 0.04]  |              |                   | 6                   |           |          |        |          |          |

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|                              | Emotional outcomes |           |          |               |          |          | Anxiety outcomes |           |          |               |          |          | Depression outcomes |           |          |               |             |            |
|------------------------------|--------------------|-----------|----------|---------------|----------|----------|------------------|-----------|----------|---------------|----------|----------|---------------------|-----------|----------|---------------|-------------|------------|
|                              | <i>k</i>           | <i>df</i> | <i>r</i> | 95% CI        | <i>F</i> | <i>p</i> | <i>k</i>         | <i>df</i> | <i>r</i> | 95% CI        | <i>F</i> | <i>p</i> | <i>k</i>            | <i>df</i> | <i>r</i> | 95% CI        | <i>F</i>    | <i>p</i>   |
| <b>Continuous moderators</b> |                    |           |          |               |          |          |                  |           |          |               |          |          |                     |           |          |               |             |            |
| <i>Intercept</i>             |                    | 224       | 0.11**   | [0.04, 0.17]  |          |          |                  | 114       | 0.08     | [0.00, 0.15]  |          |          |                     | 19        | 0.11     | [-0.14, 0.34] |             |            |
| Offspring age at assessment  | 226                | 224       | 0.00     | [0.00, 0.00]  | 1.45     | .23      | 116              | 114       | 0.00     | [0.00, 0.00]  | 1.82     | .18      | 21                  | 19        | 0.00     | [0.00, 0.00]  | 0.09        | .77        |
| <i>Intercept</i>             |                    | 201       | 0.17***  | [0.11, 0.22]  |          |          |                  | 103       | 0.16***  | [0.09, 0.22]  |          |          |                     | 19        | 0.01     | [-0.13, 0.16] |             |            |
| Offspring sex                | 203                | 201       | 0.00     | [0.00, 0.00]  | 0.88     | .35      | 105              | 103       | 0.00     | [0.00, 0.00]  | 1.05     | .31      | 21                  | 19        | 0.00*    | [0.00, 0.00]  | <b>7.12</b> | <b>.02</b> |
| <i>Intercept</i>             |                    | 233       | -0.86    | [-1.00, 1.00] |          |          |                  | 122       | 0.47     | [-1.00, 1.00] |          |          |                     | 19        | -1.00    | [-1.00, 1.00] |             |            |
| Year of publication          | 235                | 233       | 0.00     | [0.00, 0.00]  | 0.21     | .64      | 124              | 122       | 0.00     | [0.00, 0.00]  | 0.02     | .88      | 21                  | 19        | 0.00     | [-0.02, 0.03] | 0.18        | .67        |
| <i>Intercept</i>             |                    | 233       | 0.15***  | [0.12, 0.18]  |          |          |                  | 122       | 0.14***  | [0.11, 0.17]  |          |          |                     | 19        | 0.14*    | [0.04, 0.24]  |             |            |
| Time lag                     | 235                | 233       | 0.00     | [-0.01, 0.01] | 0.01     | .93      | 124              | 122       | 0.00     | [-0.01, 0.01] | 0.15     | .70      | 21                  | 19        | -0.02    | [-0.08, 0.04] | 0.38        | .55        |

*Note.* Boldface indicates significant *F* tests and their *p* values. Dashes are used to indicate that there were no adequate data to support the analyses for the specific moderator.

\**p* < .05, \*\**p* < .01, \*\*\**p* < .001.

<sup>a</sup> Subgroup not included in the moderator analyses.

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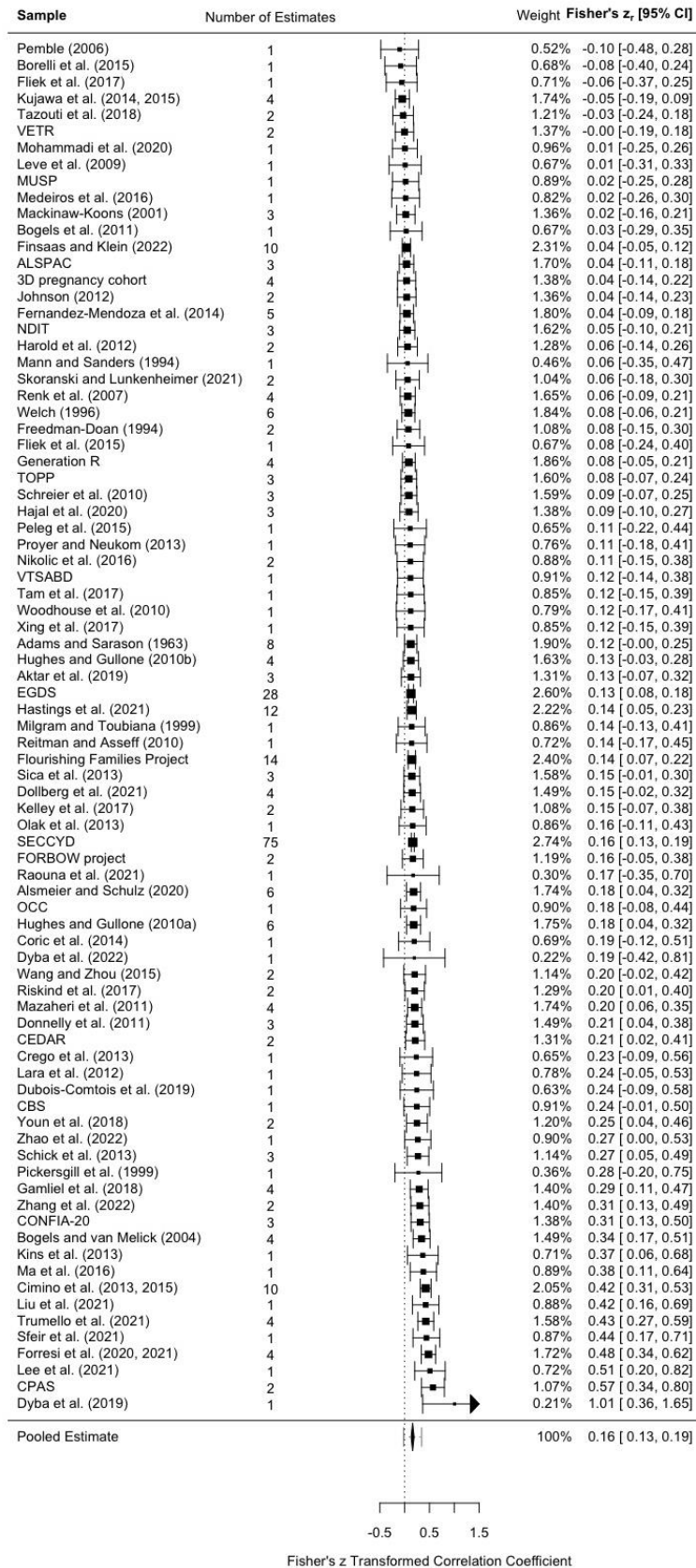


Figure 2.2 Forest Plot for Meta-analysis of the Association Between Paternal Anxiety and All Offspring Emotional and Behavioural Outcomes

*Note.* The forest plot represents a meta-analysis of aggregated samples for readers' ease and is an approximate representation of the three-level meta-analysis reported in the text. 3D pregnancy cohort = Design, Develop, Discover pregnancy cohort; ALSPAC = Avon Longitudinal Study of Parents and Children study; CBS = Central Bureau of Statistics of Norway; CEDAR = Center for Education and Drug Abuse Research; CONFIA-20 = Confinement Effects on Families and Children study; CPAS = COVID-19 Pandemic Adjustment Survey; EGDS = Early Growth and Development Study; FORBOW project = Families Overcoming Risks and Building Opportunities for Well-being project; MUSP = Mater-University Study of Pregnancy; NDIT = Nicotine Dependence in Teens Study; OCC = Danish Odense Child Cohort; SECCYD = Study of Early Child Care and Youth Development; TOPP = Tracking Opportunities and Problems in Childhood and Adolescence study; VETR = Vietnam Era Twin Registry; VTSABD = Virginia Twin Study of Adolescent Behavioural Development surveys.

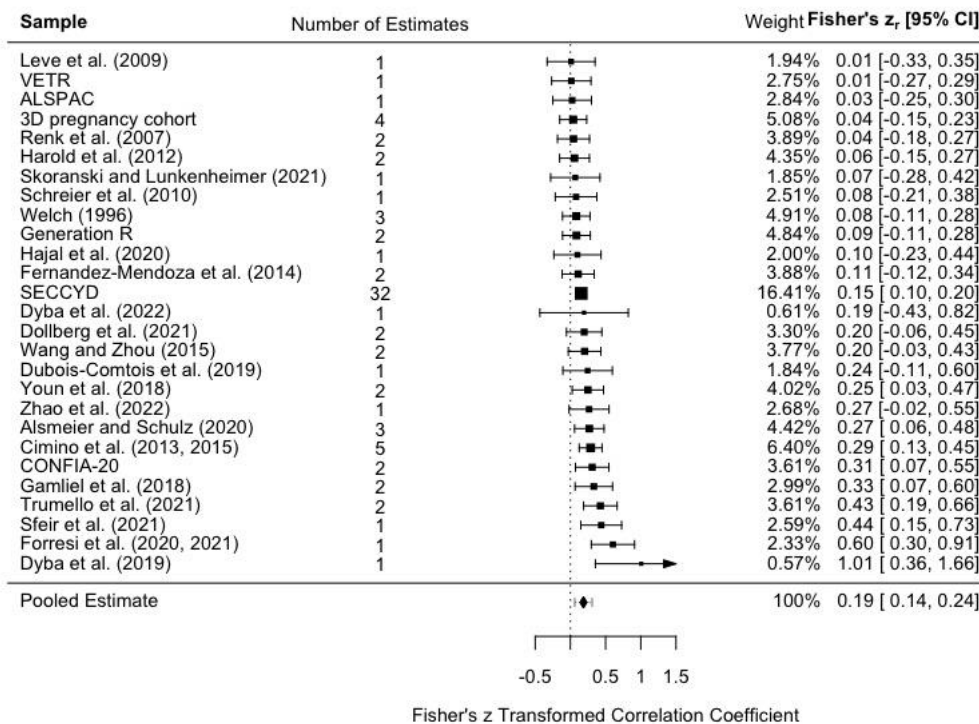


Figure 2.3 Forest Plot for Meta-analysis of the Association Between Paternal Anxiety and Offspring Behavioural Outcomes

*Note.* The forest plot represents a meta-analysis of aggregated samples for readers' ease and is an approximate representation of the three-level meta-analysis reported in the text. 3D pregnancy cohort = Design, Develop, Discover pregnancy cohort; ALSPAC = Avon Longitudinal Study of Parents and Children study; CONFIA-20 = Confinement Effects on Families and Children study; SECCYD = Study of Early Child Care and Youth Development; VETR = Vietnam Era Twin Registry.

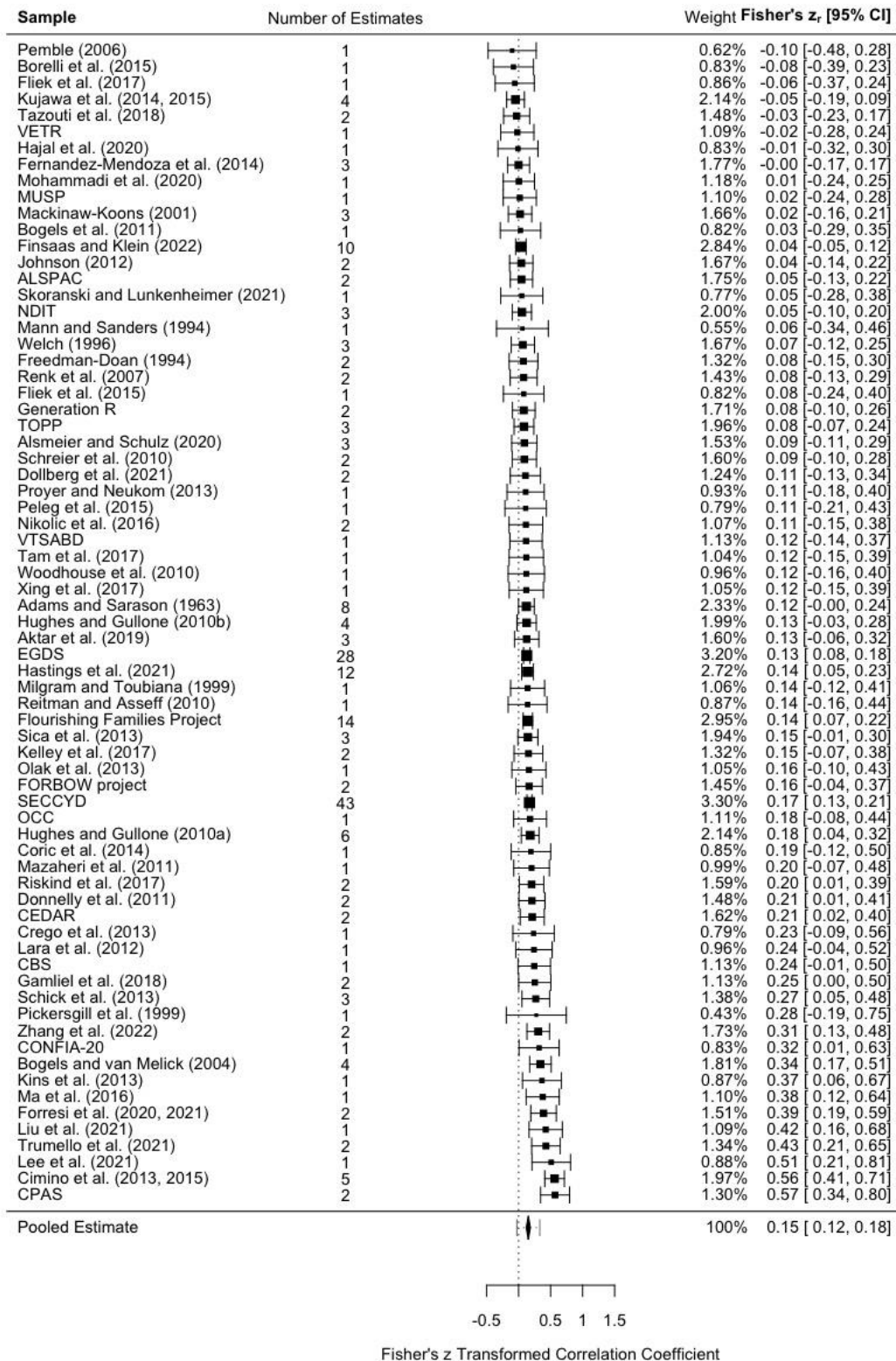


Figure 2.4 Forest Plot for Meta-Analysis of the Association Between Paternal Anxiety and Offspring Emotional Outcomes

Note. The forest plot represents a meta-analysis of aggregated samples for readers' ease and is an approximate representation of the three-level meta-analysis reported in the text. ALSPAC = Avon Longitudinal Study of Parents and Children study; CBS = Central Bureau of Statistics of Norway; CEDAR = Center for Education and Drug Abuse Research; CONFIA-20 = Confinement

Effects on Families and Children study; CPAS = COVID-19 Pandemic Adjustment Survey; EGDS = Early Growth and Development Study; FORBOW project = Families Overcoming Risks and Building Opportunities for Well-being project; MUSP = Mater-University Study of Pregnancy; NDIT = Nicotine Dependence in Teens Study; OCC = Danish Odense Child Cohort; SECCYD = Study of Early Child Care and Youth Development; TOPP = Tracking Opportunities and Problems in Childhood and Adolescence study; VETR = Vietnam Era Twin Registry; VTSABD = Virginia Twin Study of Adolescent Behavioural Development surveys.

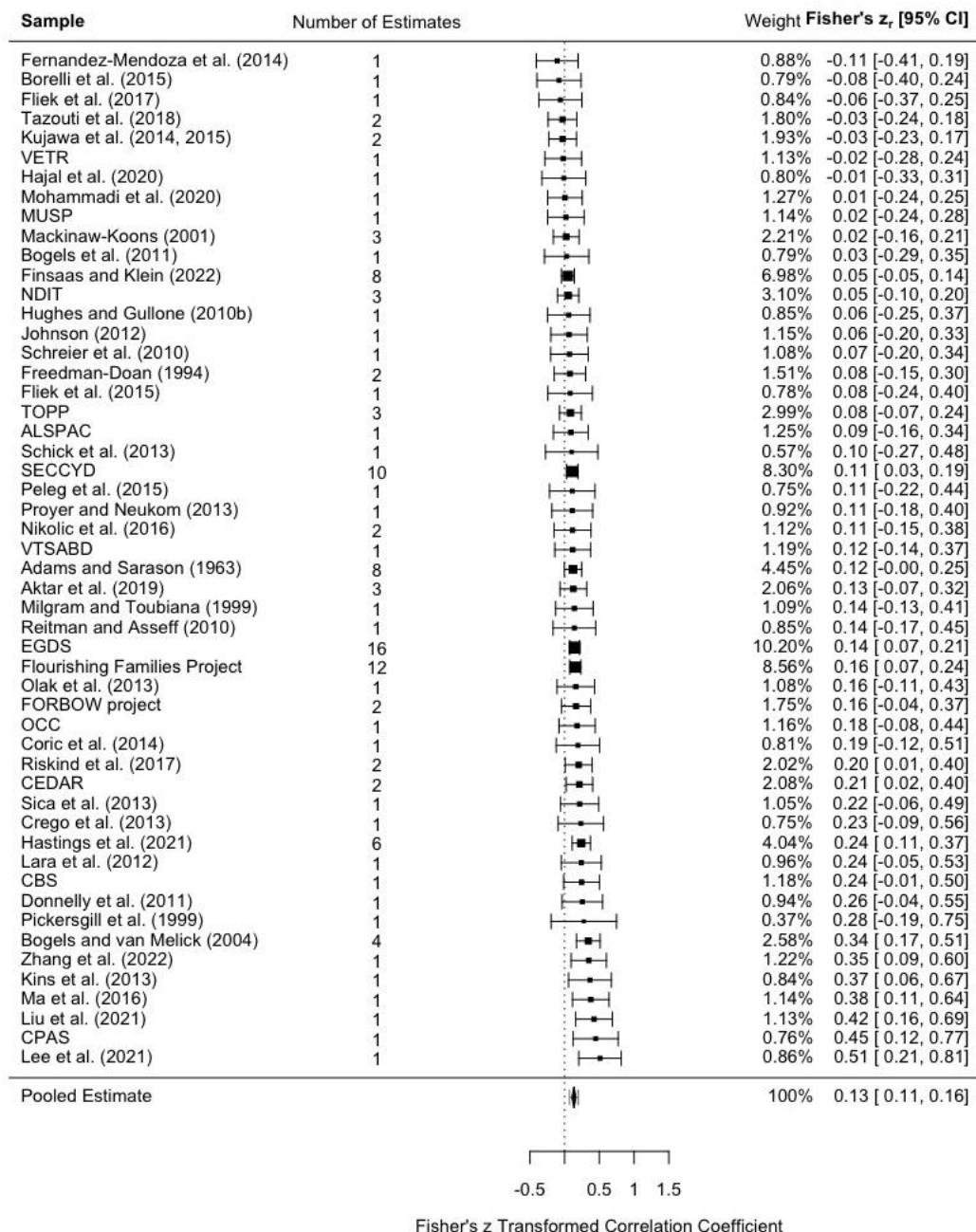


Figure 2.5 Forest Plot for Meta-analysis of the Association Between Paternal Anxiety and Offspring Anxiety Outcomes

Note. The forest plot represents a meta-analysis of aggregated samples for readers' ease and is an approximate representation of the three-level meta-analysis reported in the text. ALSPAC =

Avon Longitudinal Study of Parents and Children study; CBS = Central Bureau of Statistics of Norway; CEDAR = Center for Education and Drug Abuse Research; CPAS = COVID-19 Pandemic Adjustment Survey; EGDS = Early Growth and Development Study; FORBOW project = Families Overcoming Risks and Building Opportunities for Well-being project; MUSP = Mater-University Study of Pregnancy; NDIT = Nicotine Dependence in Teens Study; OCC = Danish Odense Child Cohort; SECCYD = Study of Early Child Care and Youth Development; TOPP = Tracking Opportunities and Problems in Childhood and Adolescence study; VETR = Vietnam Era Twin Registry; VTSABD = Virginia Twin Study of Adolescent Behavioural Development surveys.

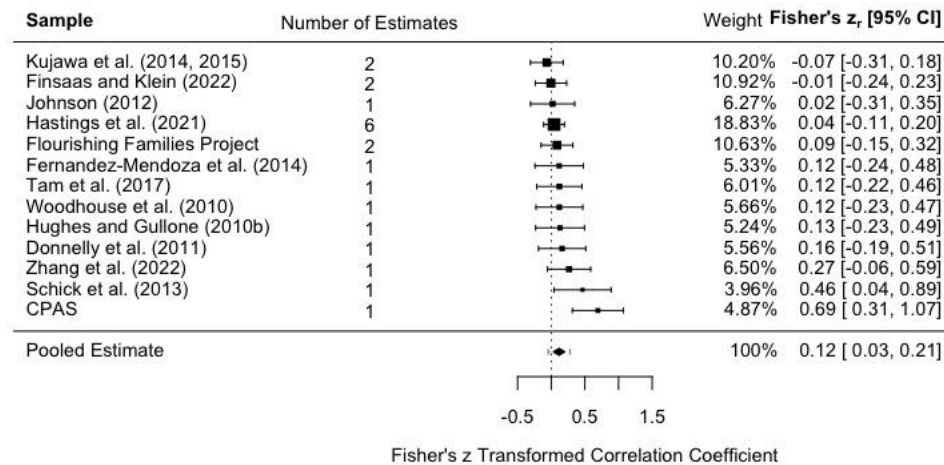


Figure 2.6 Forest Plot for Meta-analysis of the Association Between Paternal Anxiety and Offspring Depression Outcomes

*Note.* The forest plot represents a meta-analysis of aggregated samples for readers' ease and is an approximate representation of the three-level meta-analysis reported in the text. CPAS = COVID-19 Pandemic Adjustment Survey.

## 2.4 Discussion

To our knowledge, this is the first meta-analysis examining the associations between paternal anxiety and emotional and behavioural outcomes of offspring. We found significant positive associations between paternal anxiety and offspring emotional and behavioural problems ( $r = 0.16$ , 95% CI [0.13, 0.19],  $k = 322$ ,  $N = 54,998$ ), including behavioural only ( $r = 0.19$ , 95% CI [0.13, 0.24],  $k = 79$ ,  $n = 10,958$ ), emotional only ( $r = 0.15$ , 95% CI [0.12, 0.18],  $k = 235$ ,  $n = 52,327$ ), anxiety ( $r = 0.13$ , 95% CI [0.11, 0.16],  $k = 124$ ,  $n = 47,113$ ), and depression ( $r = 0.13$ , 95% CI [0.03, 0.23],  $k = 21$ ,  $n = 4,502$ ) outcomes, with small and small-to-medium effect sizes (Funder & Ozer, 2019).

Our results support the importance of paternal anxiety in offspring emotional and behavioural development and are consistent with findings from previous systematic reviews and meta-analyses examining the associations between parental psychopathology and offspring emotional (Ahmadzadeh et al., 2021; Connell & Goodman, 2002; Lawrence et al., 2019a; Micco et al., 2009; Trepia et al., 2022) and behavioural (Connell & Goodman, 2002; Jami et al., 2021) problems. The magnitude of the effects is comparable with the impact of maternal anxiety, which has been found to be linked to offspring emotional and behavioural problems with small (Connell & Goodman, 2002) or medium effect sizes, with stronger associations when only emotional outcomes are considered (Rogers et al., 2020a).

The small effect size found in our meta-analysis for anxiety outcomes is consistent with Trepia et al. (2022); however, our results for offspring anxiety and depression outcomes are distinct from earlier meta-analyses (Lawrence et al., 2019a; Micco et al., 2009), where parental ADs posed greater risk for offspring anxiety as compared to depressive disorders. Mothers were included in both meta-analyses (Lawrence et al., 2019a; Micco et al., 2009), which might account for the stronger associations for offspring anxiety compared with depression. Indeed, as noted by Lawrence et al. (2019a), for the studies included in their meta-analysis in which only one parent was included, it was not always possible to determine whether this was a mother or a father. Notably, our sensitivity analyses showed that the association between paternal anxiety and depression outcomes became nonsignificant when removing the COVID-19 Pandemic Adjustment Survey (CPAS) sample (Westrupp et al., 2021). It is possible that the magnitude of the effect sizes found in the CPAS sample is particularly large because of the COVID-19 pandemic, which has been found to be linked to an increased prevalence and higher severity of mental health problems (Rogers et al., 2020b).

The analyses yielded similar effect sizes regardless of which offspring outcome was assessed. Thus, our findings are consistent with the principles of multifinality (Cicchetti & Rogosch, 1996) and pleiotropy (Cross-Disorder Group of the Psychiatric Genomics Consortium, 2013) in developmental psychopathology, with paternal anxiety significantly associated with both

emotional and behavioural outcomes of offspring, though we cannot draw causal inferences. This is a particularly key finding, considering that recent meta-analyses in the field have focused exclusively on emotional problems (Ahmadzadeh et al., 2021; Lawrence et al., 2019a; Micco et al., 2009; Trepiak et al., 2022). The evolutionary-rooted prominent role played by fathers in encouraging children's autonomy and in providing a way into the outside world (Winnicott, 1964) may make fathers, and their ADs or symptoms, particularly important in the development of offspring behavioural outcomes (Bögels & Phares, 2008).

We also found that some of the associations between paternal anxiety and offspring outcomes were moderated by study-level variables (e.g., method of assessing psychopathology in offspring and rater of offspring outcomes, country in which the study was conducted, and year of study publication) as well as by offspring sex. In particular, across all the moderation analyses for which data were analysable, we found weaker associations when the assessment of offspring outcomes relied on a diagnostically based categorical approach (the magnitude of the effect was particularly small for anxiety outcomes,  $r = 0.06$ ) and stronger associations when the assessment relied on symptom ratings. These results are in line with previous meta-analyses (Connell & Goodman, 2002) and may reflect an overestimation of self- or parent-assessed mental health problems or an underestimation of expert-assessed psychopathology among offspring. However, a relatively small number of studies used diagnostic interviews to assess offspring outcomes, as compared to studies using only measures of symptom severity; hence, these findings should be considered with caution. It should also be noted that questionnaires, as compared to diagnostic interviews, provide continuous measures that capture more variance, which, in turn, translates into more statistical power to detect differences among participants (Altman & Royston, 2006). This likely contributed to the relatively stronger associations found for questionnaire-assessed outcomes. Furthermore, these differences may be related to the rater of the offspring outcomes. Across all the moderation analyses for which data were analysable, we found the strongest associations when fathers rated their offspring negative outcomes. These findings are consistent with Connell and Goodman

(2002) and, as noted by them, may have several explanations: parents, and fathers in particular, may be more sensitive than other informants to the presence of emotional or behavioural problems in their offspring, but it is also possible that the presence of anxiety in fathers leads to biased reporting of offspring problems by fathers, or parents in general (e.g., shared rater bias, shared method variance; Connell & Goodman, 2002; Krasikova & LeBreton, 2012). However, there were too few studies to test the effects from other raters, such as teachers, and offspring outcomes were assessed by a professional in only a minority of studies. Overall, differences in the magnitude of effects across raters and methods of assessment highlight the importance of collecting information from multiple informants and adopting different methods, to reduce the problem of rater assessment bias (Bögels & van Melick, 2004) and obtain a more complete picture of offspring's functioning (Connell & Goodman, 2002). Effect sizes were the largest for studies conducted in Asia and in the Middle East and the smallest for studies conducted in North America; these differences may reflect an impact of cultural factors, but are also likely to evidence publication bias in countries where there has been less research; indeed, these findings should be taken with caution, considering the much smaller number of included studies conducted in Asia compared with studies conducted in North America. The association between paternal anxiety and offspring behavioural problems was moderated by the publication year, with stronger effect sizes over time, potentially reflecting the changing cultural expectations for fatherhood and the increasing levels of paternal involvement in childrearing as well as an increasing awareness of symptoms of mental health problems in children (Cabrera & Tamis-LeMonda, 2013). Indeed, the growing attention directed to fathers and their impact on children's development is reflected in the literature included in our review, with more studies examining paternal mental health in recent years. Offspring sex significantly moderated only the association between paternal anxiety and offspring depression outcomes, with stronger associations found for female offspring. These results are in line with previous studies examining the association between mother and offspring mental health (Blackford & Walden, 1998; Gerull & Rapee, 2002), but should be considered with caution in that no significant

moderation effect of offspring sex was found for the other offspring outcomes examined in this review.

We preregistered our protocol and conducted a comprehensive meta-analysis adhering to the PRISMA guidelines (Page et al., 2021a) examining the association between paternal anxiety (symptoms and diagnoses) and emotional and behavioural offspring outcomes (symptoms and diagnoses). The  $k = 98$  included studies provided some geographical diversity, and fathers were drawn from both high-risk (e.g., clinical or vulnerable) and non-high-risk (i.e., community) populations, enhancing the generalizability of our findings. Moreover, we set no limits for offspring age or publication language or date. Finally, we were able to account for the dependencies in our data fitting meta-analytic three-level models via restricted maximum likelihood procedures.

While our review reflects the current state of available literature, the samples in our meta-analyses comprise mostly White European American participants, and hence the results are skewed toward the demographics of those who are more represented in the included studies. We do not know how well these results would transfer, or generalise, to other populations. Further, in the meta-analytic models, studies with greater statistical power (i.e., larger sample sizes) were given more weight, thereby influencing the pooled effect estimate to a greater extent, leading to findings skewed toward the participant demographics within these larger, better-powered samples. This was particularly true for the depression and anxiety outcomes models, where the greatest samples were more representative of White European American groups: Hastings et al. (2021), Finsaas and Klein (2022), Flourishing Families Project (Apsley & Padilla-Walker, 2020; Gibbons, 2021), Kujawa et al. (2015), and Kujawa et al. (2014) for the depression outcomes model, and Early Growth and Development Study (Ahmadzadeh et al., 2019; Chen et al., 2020; Natsuaki et al., 2013), Flourishing Families Project (Apsley & Padilla-Walker, 2020; Gibbons, 2021), and Study of Early Child Care and Youth Development (Bailey & Marker, 2021; Keizer, 2012; Marker & Bailey, 2022; Mathews, 2021; Parrigon & Kerns, 2016; Partain et al., 2022; Ranney et al., 2021) for the anxiety outcomes model, respectively. The

moderators we examined did not include factors such as adverse experiences, trauma, familial composition, comorbidities, and cultural variables. Most studies did not report adjusted vs unadjusted results for confounding variables, including maternal anxiety. Thus, most of the effect estimates extracted for our analyses were unadjusted for confounders (i.e., Pearson  $r$  correlations). Therefore, our reported pooled effect estimates include confounding variables, and we could not test the extent to which confounding by mothers' mental health was at play. Furthermore, due to the variability in the way information was reported in the primary research, we could not test some moderators we did include in our protocol (SES, ethnicity/race, and offspring temperament), despite evidence showing the importance of these factors in the intergenerational transmission of psychopathology (Oliver-Parra, Dalmau-Bueno, Ruiz-Muñoz, & García-Altés, 2020). We were unable to examine the associations between paternal anxiety and specific behavioural offspring outcomes due to the relatively small number of studies measuring behavioural outcomes and the heterogeneity within this subgroup. We accounted for statistical heterogeneity in our analyses; however, the interpretation of our meta-analytic results is limited by the high levels of heterogeneity observed across studies and samples (particularly for child anxiety outcomes) that could not be explained by the moderator analyses. This may reflect not only the presence of additional confounding variables (such as other environmental stressors and shared genes) that were not accounted for in the present study, but also the substantial level of variability, particularly in the designs and assessment methods, in the existing literature.

Conceptually, our findings indicate that paternal mental health is a pivotal factor for offspring mental health and demonstrate that the offspring of fathers with anxiety symptoms and/or disorders are at increased risk of negative emotional and behavioural outcomes, in line with the principles of multifinality (Cicchetti & Rogosch, 1996) and pleiotropy (Cross-Disorder Group of the Psychiatric Genomics Consortium, 2013). Our results also highlight that the methods used to design studies and collect and analyse data matter, pointing to the need of triangulation across methods and approaches. Nevertheless, this study shows that presently many racial

and ethnic groups are underrepresented and thereby not well served by family mental health research; thus, more research is needed before we can generalize findings across populations globally. Our study assumes heteronormative families, and it is key that future research differentiates between sex and gender of parents and offspring. To draw more conclusive results, more studies examining the associations between paternal anxiety and offspring emotional and behavioural problems are needed. The present study did not allow the comparison of maternal and paternal impact on offspring outcomes, but it is important that future research includes both mothers and fathers to be able to tease apart their relative contributions.

Clinically, our findings underline the importance of considering mental health of offspring when working with fathers with ADs and, at the same time, highlight the need to account for ADs of fathers when working with children with emotional and/or behavioural problems and when planning the implementation of intervention or prevention strategies. This is especially important in relation to the body of literature that assigns fathers a unique role in promoting their children's independence and transition to the outside world, which is likely to be negatively impacted if the father experiences anxiety (Bögels & Phares, 2008; Winnicott, 1964). Because emotional and behavioural problems are likely to co-occur in offspring, we argue that the findings relating to general psychopathology of offspring are the most relevant for clinicians.

The overarching goal of this study was to provide a comprehensive estimate of the magnitude of the association between paternal anxiety and emotional and behavioural problems of offspring. We tested the association between fathers' anxiety and general psychopathology of offspring as well as individual behavioural, emotional, anxiety, and depression outcomes. Overall, our findings indicate that paternal anxiety is positively associated with a generalised vulnerability to psychopathology, in line with principles of multifinality (Cicchetti & Rogosch, 1996) and pleiotropy (Cross-Disorder Group of the Psychiatric Genomics Consortium, 2013). However, the generalizability of the findings is challenged by the

substantial heterogeneity among studies that was not explained by the tested moderators and by the sample that comprises mostly White European American groups.

# **Chapter 3 The Impact of Perinatal Exposure to Paternal Anxiety on Offspring: A Prospective Study Using the Avon Longitudinal Study of Parents and Children (ALSPAC) Cohort**

## **Notes**

This Chapter was submitted as a research paper in *Development and Psychopathology* and is currently undergoing peer-review.

## **CRedit (Contributor Roles Taxonomy)**

Francesca Zecchinato: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Software, Visualization, Writing – original draft, Writing – review and editing

Jana Kreppner: Conceptualization, Project administration, Supervision, Writing – review & editing

Peter J. Lawrence: Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing – review & editing

## Abstract

**Background:** Paternal perinatal mental health influences subsequent child development, yet is under-investigated. This study aimed to examine the impact of different timings of paternal perinatal anxiety (prenatal-only, postnatal-only, and both pre- and postnatally) on children's subsequent emotional and behavioural difficulties.

**Method:** We used data from the Avon Longitudinal Study of Parents and Children and tested the prospective associations between anxiety in fathers (via the Crown-Crisp Experiential Index) and adverse mental health outcomes in children at 42- and 91-months. We reported unadjusted odds ratios (ORs) and ORs adjusted for sociodemographic variables, child temperament, and parental mental health.

**Results:** Children whose fathers were anxious in the perinatal period were at higher risk of subsequent adverse outcomes, compared to children whose fathers were not anxious perinatally. At 42-months, the highest risk group was the one with fathers anxious prenatally-only; compared to children with non-anxious fathers, children in the prenatal-only group were significantly more likely to present mental health difficulties, measured by total problems (unadjOR = 1.82, 95% CI [1.28, 2.53]), and the associations remained significant in the adjusted models. At 91-months, children exposed to paternal anxiety both pre- and postnatally were at higher risk of any psychiatric disorder (unadjOR = 2.35, 95% CI [1.60, 3.37]) compared to the non-anxious group, and the associations remained significant in the adjusted models.

**Conclusions:** Paternal perinatal anxiety is a risk factor for child adverse outcomes, even after accounting for maternal mental health, child temperament, and key sociodemographic factors, and should not be overlooked in research and clinical practice.

**Keywords:** ALSPAC; anxiety; child development; fathers; perinatal.

### 3.1 Introduction

Anxiety disorders (ADs) are the most prevalent psychiatric condition worldwide, with approximately 301 million people living with an anxiety-related problem (Our World in Data, 2019). Between 6.57% and 13.54% of new fathers have an AD (Leiferman et al., 2021), a considerably higher prevalence than the prevalence of ADs in men generally, estimated to range between 2.2 and 3.8% (World Health Organization, 2017), suggesting that the transition to fatherhood may represent a risk factor for anxiety (Leiferman et al., 2021).

Perinatally, mental health problem onset or exacerbation is common in both fathers and mothers (Challacombe et al., 2023). Furthermore, maternal and paternal mental health are linked. For example, meta-analytic evidence shows that maternal depression increases the likelihood of paternal postnatal anxiety (odds ratio [OR] = 3.86, 95% CI [2.54-5.89]; Chhabra et al., 2020).

Children's mental health is affected by their parents' mental health (Uher et al., 2023). For instance, children whose parents have ADs, compared to children whose parents do not, have a significantly higher risk of mental health problems (Ahmadzadeh et al., 2021; Lawrence et al., 2019a; Uher et al., 2023; Zecchinato, Ahmadzadeh, Kreppner, & Lawrence, 2024). However, the mechanisms of intergenerational transmission of psychopathology remain poorly understood.

The degree to which psychosocial risks operate directly through psychosocial mechanisms is a central theoretical question in developmental psychopathology. Different timings of parental mental illness (including offspring exposure pre- and/or postnatally) may be linked to specific pathways in relation to child outcomes (Rajyaguru, Kwong, Braithwaite, & Pearson, 2021; Stein et al., 2014). Substantial evidence supports the importance of environmental mechanisms (e.g., parental context, altered parenting behaviours), even when accounting for genetic predisposition (Ahmadzadeh et al., 2019). Nevertheless, evidence is inconsistent; some suggest that direct (i.e., postnatal) exposure to parent mental ill-health is necessary to observe adverse offspring outcomes (e.g., Ahmadzadeh et al., 2021), but some

suggest sufficiency of only prenatal (indirect) exposure to psychosocial risks (e.g., parental mental ill-health) for poor child psychological adjustment (e.g., Barker et al., 2011), in line with the biological programming hypothesis (Van den Bergh et al., 2005). Consequently, when studying the intergenerational transmission of psychopathology and the nature of risk mechanisms, it is key to distinguish between prenatal and postnatal parental psychopathology and compare direct with indirect exposure (Ramchandani et al., 2008).

To examine the differential effects of paternal prenatal-only and postnatal-only depression for children's subsequent emotional and behavioural functioning, Ramchandani et al. (2008) used the data from a large cohort study and conducted a natural experimental design, comparing only prenatal to only postnatal (and to both prenatal *and* postnatal) exposure to paternal depression. Children whose fathers were depressed both pre- and postnatally, compared to children whose fathers were not depressed, had the highest risks of emotional and behavioural problems at 3.5 years (OR = 3.55, 95% CI [2.07, 6.08]) and psychiatric diagnosis at 7 years (OR = 2.54, 95% CI [1.19, 5.41]; Ramchandani et al., 2008).

Father-specific contributions to children's mental health difficulties have been under-investigated, especially compared to maternal-specific contributions (Bögels & Phares, 2008). The risk posed by paternal anxiety, particularly perinatally, for offspring mental health difficulties is unclear (Bögels & Phares, 2008; Zecchinato et al., 2024). In a recent meta-analysis examining the associations between fathers' anxiety and offspring adverse outcomes, Zecchinato et al. (2024) found significant, positive associations between paternal anxiety and offspring emotional and behavioural problems overall ( $r = .16$ , 95% CI [.13, .19],  $N = 54,998$ ), as well as behavioural ( $r = .19$ , 95% CI [.13, .24],  $n = 10,958$ ), emotional ( $r = .15$ , 95% CI [.12, .18],  $n = 52,327$ ), anxiety ( $r = .13$ , 95% CI [.11, .16],  $n = 47,113$ ), and depression outcomes ( $r = .13$ , 95% CI [.03, .23],  $n = 4,502$ ). However, only a relatively small number of studies have examined the association between paternal anxiety and offspring behavioural outcomes. The risk posed by indirect and direct exposure to paternal anxiety perinatally, specifically for child emotional and behavioural development, is also poorly understood (Challacombe et al., 2023). Further, prior

examinations of risk transmission from fathers' anxiety have omitted to account for factors shown to be important in the intergenerational transmission of risk of psychopathology (e.g., maternal and paternal current and past mental health, child temperament, sociodemographic variables such as parent education, ethnicity, age, and social class; Zecchinato et al., 2024).

### **3.1.1 Study Aims**

We aimed to elucidate fathers' contribution to the intergenerational transmission of psychopathology and test different timings of paternal perinatal anxiety (prenatal-only, postnatal-only, and paternal anxiety both pre- and postnatally) in relation to children's subsequent psychological functioning. Building on the existing evidence (Ramchandani et al., 2008; Sandstrom et al., 2020; Zecchinato et al., 2024), we controlled for the potential effect of the familial context (key sociodemographic characteristics, paternal and maternal current and past mental health) and child temperament. Following the study design by Ramchandani et al. (2008) and using the data from the ALSPAC cohort, we employed a prospective study design to compare child outcomes (also specifying between behavioural and emotional difficulties) at 42- and 91-months in four mutually exclusive groups: 1) children whose fathers were anxious neither prenatally nor postnatally (non-anxious group); 2) children whose fathers were anxious prenatally only (prenatal-only group); 3) children whose fathers were anxious postnatally only (postnatal-only group); and 4) children whose fathers were anxious both prenatally and postnatally (anxious-at-both-times group). The unique research design presented here allowed us to explore patterns of data that could indicate different mechanisms by which the intergenerational transmission of risk from fathers to their offspring may occur.

We hypothesised that:

- 1) paternal anxiety would represent a risk factor for child outcomes at both 42- and 91-months; hence, we predicted a difference between the non-anxious group (1) and all three anxious groups (groups 2, 3 and 4), with worse emotional and/or behavioural outcomes in 2, 3, and 4, compared to 1.

- 2) direct psychological exposure (group 3) would predict more severe child emotional/behavioural outcomes than indirect exposure alone (group 2), considering that it would reflect risk transmitted via environmental means, including altered parenting behaviour, in addition to potential underlying genetic risk; hence, we expected that children with fathers in the postnatal-only group (3) would show worse outcomes than children in the prenatal-only group (2).
- 3) the group of children exposed to paternal anxiety at both times (4), compared to groups 1, 2 and 3, would be at greater, cumulative risk of adverse behavioural/emotional outcomes.

Figure 3.1 provides a visual representation of the study hypotheses.

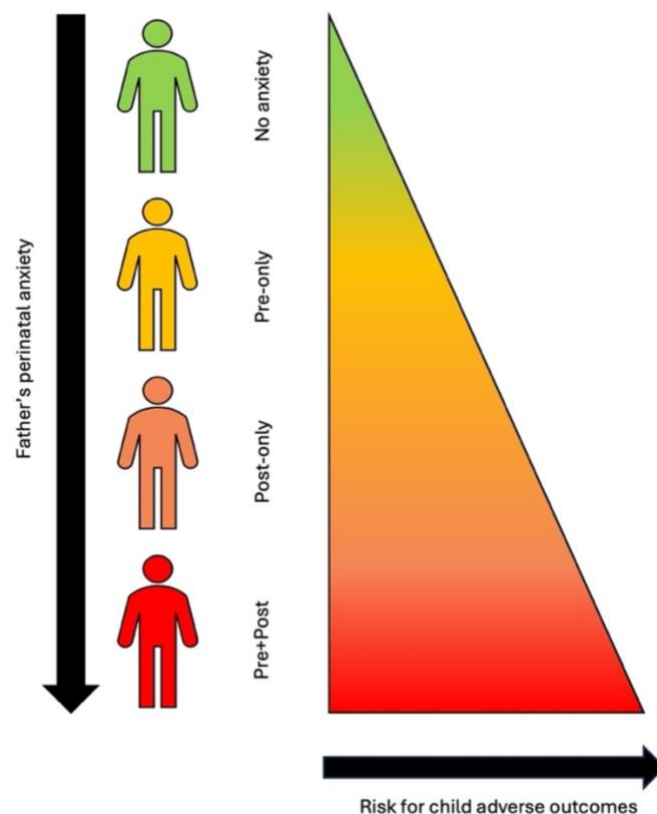


Figure 3.1 Visual Representation of the Study Hypotheses

*Note.* No anxiety = fathers who were anxious neither prenatally nor postnatally; pre-only = fathers who were anxious only prenatally (18-week gestation assessment); post-only = fathers who were anxious only postnatally (8-week postnatal assessment); pre+post = fathers who were anxious both pre- and postnatally (18-week gestation assessment and 8-week postnatal assessment).

## 3.2 Methods

The sample comprised participants from the Avon Longitudinal Study of Parents and Children (ALSPAC; Golding, Pembrey, & Team, 2001), a large, population-based birth cohort. Pregnant women resident in Avon, UK with expected delivery dates between 1st April 1991 and 31st December 1992 were invited to participate; the initial number of pregnancies enrolled was 14,541, and 13,988 had children who were alive at 1 year of age. 14,203 unique mothers were initially enrolled in the study. Partners were invited to complete questionnaires by the mothers at the start of the study and they were not formally enrolled at that time; 12,113 unique partners have been in contact with the study by providing data and/or formally enrolling when this started in 2010, and 3,807 partners are currently enrolled. We included the subsample of participants with complete exposure (i.e., paternal prenatal and postnatal anxiety) and offspring outcome (at 42- and 91-months) data. Figure 3.2 gives an overview of the study sample derivation.

To maximise analytical power to examine magnitude of risk and confounding effects, we used all available data from exposures and outcomes. All missing data from the covariates were imputed before conducting the adjusted logistic regressions (White et al., 2011). Full details of the imputation method are in Appendix D, section D.1.

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2013. Ethical approval and informed consent were obtained for all procedures involving human participants from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees (<http://www.bristol.ac.uk/alspac/researchers/research-ethics/>) and from the University of Southampton Research Governance and Ethics Committee (ERGO ID: 88927). Information about ALSPAC is available at [www.bristol.ac.uk/alspac/](http://www.bristol.ac.uk/alspac/), including a fully searchable data dictionary and variable search tool (<http://www.bris.ac.uk/alspac/researchers/our-data/>). Further details on the cohort profile, representativeness and phases of recruitment are

described in three cohort-profile papers (Boyd et al., 2013; Fraser et al., 2013; Northstone et al., 2023).

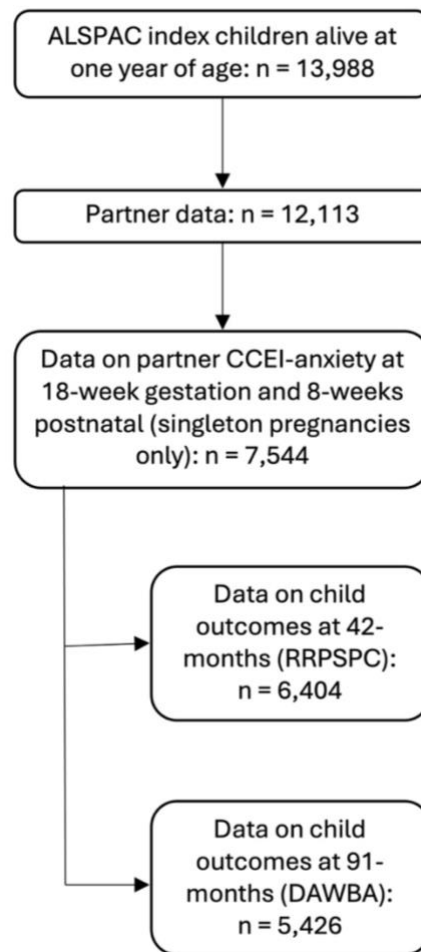


Figure 3.2 Overview of the Study Sample Derivation

*Note.* ALSPAC = Avon Longitudinal Study of Parents and Children; CCEI = Crown-Crisp Experiential Index; RRPSPC = Revised Rutter Parent Scale for Preschool Children; DAWBA = Development and Wellbeing Assessment - Parent Questionnaire.

### 3.2.1 Study Design

We used the available ALSPAC data to create four mutually exclusive groups for comparison: non-anxious (1), prenatal-only (2), postnatal-only (3), anxious-at-both-times (4). This study design allowed us to disaggregate direct (i.e., postnatal) from indirect (i.e., prenatal) exposure as mechanisms of risk transmission. Hence, we could test whether direct exposure,

compared to indirect exposure, to paternal anxiety predicts greater risk of offspring emotional and behavioural outcomes. The logic and key comparisons of the design are as follows:

- a) if paternal anxiety carries no risk for the child (via any risk mechanism), then there should be no difference between the non-anxious (1) and any of the three anxious groups (2, 3 and 4). This is the initial null hypothesis, representing an important baseline.
- b) The second comparison was between the non-anxious group (1) and the prenatal-only (2) and postnatal-only (3) groups. If direct exposure to paternal anxiety is necessary for adverse outcomes in offspring, then the children with fathers in the postnatal-only group (3) would show worse outcomes than children in the non-anxious (1) and prenatal-only (2) groups.
- c) The third comparison of interest was between the prenatal-only group (2) and both the postnatal-only (3) and the anxious-at-both-times (4) groups, which provided an additional test of the exposure effect (i.e., anxious-at-both-times and postnatal-only > prenatal-only), as well as of severity (i.e., non-anxious < prenatal only < postnatal only < anxious-at-both-times), where children in the group with fathers anxious at both times (4) might be expected to experience higher rates of behavioural/emotional difficulties than seen in groups 1, 2 or 3.

### **3.2.2 Measures**

#### **3.2.2.1 Paternal Anxiety**

Paternal anxiety was measured at 18-weeks' gestation and at 8-weeks postnatally using the 8-item anxiety subscale of the Crown-Crisp Experiential Index (CCEI; Crown & Crisp, 1970), a validated self-rating inventory. We used the ALSPAC pro-rated scores (i.e., for missing items, scores were pro-rated using individual's mode, unless all items were missing) and considered a cut-off of the top 15% of scorers to define high anxiety levels (Capron et al., 2015).

### **3.2.2.2 Offspring Outcomes**

Our primary outcomes were any child mental health problems at 42- and 91-months.

Offspring emotional and behavioural outcomes at 42-months were assessed with the Revised Rutter Parent Scale for Preschool Children (RRPSPC; Elander & Rutter, 1996), maternal report. Items combine to form three problem scales (emotional problems, conduct problems and hyperactivity), and a prosocial behaviours scale. All problem scales combine to give a total problems scale. We used a cut-off of the top 10% of scorers to define high-scorers (Ramchandani et al., 2008). The RRPSPC has no subscale specifically for behavioural difficulties, thus children were considered 'high' in behavioural problems if they scored in the top 10% in either the conduct or hyperactivity scales (or both).

Offspring emotional and behavioural outcomes at 91-months were assessed with the Development and Wellbeing Assessment-Parent Questionnaire (DAWBA; Goodman et al., 2000), maternal and teacher report for attention deficit hyperactivity disorder, oppositional defiant disorder and conduct disorder, and maternal report only for the other disorders. The questionnaire assesses the presence of psychiatric symptoms and their impact on children's functioning, generating probable DSM-IV psychiatric diagnoses (DSM-IV-TR., 2000), confirmed by experienced clinical raters.

### **3.2.2.3 Paternal and Maternal Mental Health**

We included information on paternal and maternal self-reported current and past mental ill-health, specifically: history of severe depression and other psychiatric problems – self-reported (yes/no response) at 12-weeks' gestation for mothers and fathers; anxiety measured via the CCEI at 18-weeks' gestation and 8-weeks postnatally for mothers, and at 73-months for both parents; depression via the Edinburgh Postnatal Depression Scale (10-item; EPDS; Cox, Holden, & Sagovsky, 1987) at 18-weeks' gestation, 8-weeks postnatally, and 73-months for mothers and fathers (using a cut-off score of >12 to identify high depression; Ramchandani et al., 2008).

#### **3.2.2.4 Sociodemographic Variables**

We included fathers' age and the number of other children in the family at the time of index children's birth (6-month assessment); and paternal: education (18-weeks' gestation assessment); ethnicity (32-weeks' gestation assessment, maternal report); social class (32-weeks' gestation assessment, maternal report); and marital status (12-weeks' gestation assessment).

#### **3.2.2.5 Child Temperament**

We included information on child temperament, assessed with the Carey Infant Temperament Scale (Carey & McDevitt, 1978), mother-report at 24-months, including 88-items and nine separate subscales (i.e., activity, rhythmicity, approach, adaptability, intensity, mood, persistence, distractibility, and threshold scale).

#### **3.2.2.6 Subgroups**

We included information about the index child's sex assigned at birth and whether their biological father was living with them at the 3-year assessment, and conducted subgroup analyses on female and male offspring separately and, in order to exclude stepfather confounds, on the subgroup of participants where the biological father was living with the family at the 3-year assessment.

### **3.2.3 Statistical Analyses**

We took the steps below for the 42-month data:

- 1) Participants with complete data on the paternal pre- and postnatal CCEI anxiety measures and on the 42-month RRPSPC scales were included in the analyses. We created four paternal anxiety status groups (measured using the CCEI): no anxiety at any time point, prenatal anxiety only (prenatal-only), postnatal anxiety only (postnatal-only), and anxiety at both prenatal and postnatal times (anxious-at-both-times). The groups were then compared on a range of sociodemographic

variables that might have affected the associations between paternal anxiety and child outcomes.

- 2) Using binary logistic regression models, we conducted a series of planned contrasts to test differential effects of direct vs indirect exposure to paternal anxiety on children. The outcome in this first series of contrasts was high levels of emotional and behavioural symptoms in children at age 42-months measured using the RRPSPC. We contrasted risk in the three anxiety groups (prenatal-only, postnatal-only, and anxious-at-both-times) using the non-anxious group as the reference (baseline) group, and then undertook planned analyses directly comparing the anxious groups.
- 3) We repeated these analyses accounting for the effects of: child temperament, maternal only, and parental mental health (i.e., maternal anxiety and depression in the pre- and postnatal periods and paternal depression in the pre- and postnatal periods, history of severe depression and other psychiatric problems in parents), and for any other sociodemographic covariates that differed significantly between the anxious and non-anxious groups.
- 4) These analyses for RRPSPC scores were repeated for male and female offspring separately.
- 5) These analyses were repeated excluding those families where the biological father was no longer living with the family, to exclude stepfather confounds.

Steps 1 to 5 were repeated using psychiatric status of the children at 91-months (DAWBA) as the outcome, to examine the persistence and developmental importance of any association. Only participants with complete data on the paternal pre- and postnatal CCEI anxiety measures and on DAWBA outcomes at 91 months were included in the analyses. For consistency with the 42-month outcomes, we grouped the diagnostic outcomes in: any behavioural disorder (i.e., oppositional defiant, conduct, or attention deficit hyperactivity disorder), any emotional disorder (i.e., anxiety, obsessive compulsive, posttraumatic stress, depression disorder), and

any disorder. We also reported on any anxiety disorder in offspring, to test whether there was an association between paternal and offspring anxiety specifically. In addition to the covariates mentioned above (3), we also controlled for the effect of paternal and maternal anxiety and depression at 73 months.

Finally, we undertook the analyses for outcomes at both 42- and 91-months using continuous CCEI anxiety scores in fathers at prenatal and postnatal times as predictors, to address the potential artifacts that may derive from the use of cut-off scores.

### **3.3 Results**

#### **3.3.1 Forty-two-Month Outcomes**

- 1) Data on paternal pre- and postnatal anxiety and on child outcomes at 42-months were available for 6,404 participants. Fathers' mean age was 31.20 years (SD = 5.55) and 98% were White in ethnic origin. Of these, 303 (4.73%) were anxious only prenatally (prenatal-only group), 394 (6.15%) were anxious only postnatally (postnatal-only group), and 336 (5.25%) were anxious at both times (anxious-at-both-times group); 5,371 (83.87%) were anxious at neither time (non-anxious group). Table 3.1 provides the means and SD obtained by participants on the CCEI-anxiety pre- and postnatally. The four groups differed significantly in terms of: number of other children in the family, fathers' marital status, fathers' social class, and maternal and paternal mental health variables (see Table 3.1, where descriptive variables with missing values have been imputed. Table D1, in Appendix D, provides non-imputed data). The variables that were significantly different across the four groups were accounted for in the adjusted models.
- 2) The results of the unadjusted and adjusted models are presented in Table 3.2. For the total problems scale of the RRPSPC, children of anxious fathers had higher rates than children whose fathers had not been anxious perinatally; specifically,

the non-anxious group differed significantly from the prenatal-only group (unadjOR = 1.82, 95% CI [1.28, 2.53],  $p = .001$ ) and anxious-at-both-times group (unadjOR = 1.66, 95% CI [1.17, 2.30],  $p = .003$ ). No significant differences emerged between the non-anxious and postnatal-only groups, nor when the anxiety groups were directly compared. The prenatal-only group was significantly more likely to have emotional problems than the non-anxious group (unadjOR = 2.37, 95% CI [1.63, 3.40],  $p < .001$ ), but not behavioural problems (unadjOR = 1.40, 95% CI [.99, 2.30],  $p = .049$ ). For emotional problems, the prenatal-only and postnatal-only groups differed significantly from each other, with children with fathers anxious only postnatally half as likely to have emotional difficulties at 42-months (unadjOR = 0.49, 95% CI [.29, .83],  $p = .008$ ).

- 3) When we controlled for the effects of sociodemographic variables (adjusted Model 1), child temperament (adjusted Model 2), maternal mental health (adjusted Model 3), and maternal and paternal mental health (adjusted Model 4), we found consistent, but attenuated, patterns of associations (see Table 3.2).
- 4) When we examined outcomes for male and female offspring separately, we found similar patterns of difference for the effects of paternal anxiety as to those we found for the entire sample (see Table D2 and Table D3, in Appendix D).

Specifically, when examining female offspring only, the prenatal-only and anxious-at-both-times groups had higher rates of high total problems scores than the non-anxious group, similar to the findings in the entire sample. Moreover, the prenatal-only group was significantly more likely to show emotional problems than all the other groups. Associations remained significant in some of the adjusted models. For male offspring, we found significantly increased rates of total problems in all three anxious groups, compared to the non-anxious group. Unlike in the analyses for the entire sample, compared to the non-anxious group, the postnatal-only group had higher rates of behavioural problems. In contrast, the prenatal-only and

anxious-at-both-times groups had higher scores on the emotional problems scale (similar to the findings in the entire sample), suggesting that the direct exposure hypothesis may be relevant for behavioural problems in boys, but not for total and emotional problems. No significant differences emerged when the anxious groups were directly compared. For total problems, the associations remained significant in adjusted Model 1 and 2 when comparing the non-anxious group with the prenatal-only and postnatal-only groups, and in Model 1 when comparing the non-anxious group with the anxious-at-both-times group. No significant associations emerged in the adjusted models looking at behavioural outcomes, while for emotional problems the difference remained significant between the non-anxious and prenatal-only groups in Models 1, 2 and 3, and between the non-anxious and anxious-at-both-times groups in Model 1.

- 5) When we repeated the analyses only in those families where the biological father was still living with the family at the 3-year assessment, the patterns of significance remained consistent, with some small differences in the size and significance of the effects (see Table D4 in Appendix D).

Table 3.1 Descriptive Characteristics of the Sample Used in the Analyses Looking at the Outcomes at 42 Months (n = 6,404; Missing Values Have Been Imputed Via Multiple Imputation)

| Factor                                                  | All sample<br>(N=6,404) | Non-anxious<br>group<br>(n=5,371) | Prenatal only<br>(n=303) | Postnatal only<br>(n=394) | Anxious-at-both-<br>times group<br>(n=336) |
|---------------------------------------------------------|-------------------------|-----------------------------------|--------------------------|---------------------------|--------------------------------------------|
| Father age (mean and SD)                                | 31.20 (5.55)            | 31.15 (5.46)                      | 30.98 (6.03)             | 31.45 (6.10)              | 31.79 (5.74)                               |
| Number of other children (mean and SD) <sup>a</sup>     | .75 (.89)               | .74 (.86)                         | .71 (.85)                | .85 (.97)                 | .96 (1.15)                                 |
| Paternal prenatal anxiety (mean and SD) <sup>a,b</sup>  | 2.92 (2.70)             | 2.14 (1.79)                       | 8.13 (1.43)              | 4.10 (1.71)               | 9.40 (2.20)                                |
| Paternal postnatal anxiety (mean and SD) <sup>a,c</sup> | 2.48 (2.57)             | 1.69 (1.54)                       | 3.29 (1.44)              | 7.45 (1.84)               | 8.57 (2.35)                                |

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| Factor                                                                                  | All sample<br>(N=6,404) | Non-anxious<br>group<br>(n=5,371) | Prenatal only<br>(n=303) | Postnatal only<br>(n=394) | Anxious-at-both-<br>times group<br>(n=336) |
|-----------------------------------------------------------------------------------------|-------------------------|-----------------------------------|--------------------------|---------------------------|--------------------------------------------|
| Paternal ed. level<br>(n and % with<br>degree) <sup>d</sup>                             | 1452.25<br>(22.68%)     | 1211.47<br>(22.56%)               | 67.25 (22.19%)           | 88.81 (22.54%)            | 84.72 (25.21%)                             |
| Paternal ethnicity<br>(n and % White)                                                   | 6291.94<br>(98.25%)     | 5282.69<br>(98.36%)               | 296.84 (97.97%)          | 386.81 (98.18%)           | 325.59 (96.90%)                            |
| Paternal social<br>class (n and % I<br>and II) <sup>a,e</sup>                           | 3219.53<br>(50.27%)     | 2677.88<br>(49.86%)               | 170.81 (56.37%)          | 185.66 (47.12%)           | 185.19 (55.12%)                            |
| Child sex (n and %<br>females)                                                          | 3134.22<br>(48.94%)     | 2627.47<br>(48.92%)               | 129.53 (42.75%)          | 208.22 (52.85%)           | 169.00 (50.30%)                            |
| Marital status of<br>fathers (n and %<br>married) <sup>a</sup>                          | 5455.66<br>(85.19%)     | 4626.47<br>(86.14%)               | 241.81 (79.81%)          | 305.22 (77.47%)           | 282.16 (83.98%)                            |
| Past history of<br>severe depression<br>in fathers (n and<br>) <sup>a</sup>             | 373.78<br>(5.84%)       | 184.31 (3.43%)                    | 46.34 (15.29%)           | 57.88 (14.69%)            | 85.25 (25.37%)                             |
| Past history of<br>other psychiatric<br>problems in<br>fathers (n and %) <sup>a</sup>   | 114.59<br>(1.79%)       | 53.78 (1.00%)                     | 8.56 (2.83%)             | 15.31 (3.89%)             | 36.94 (10.99%)                             |
| Past history of<br>severe depression<br>in mothers (n and<br>) <sup>a</sup>             | 478.50<br>(7.47%)       | 372.53 (6.94%)                    | 32.28 (10.65%)           | 36.63 (9.30%)             | 37.06 (11.03%)                             |
| Past history of<br>other psychiatric<br>problems in<br>mothers (n and<br>) <sup>a</sup> | 134.06<br>(2.09%)       | 105.16 (1.96%)                    | 5.13 (1.69%)             | 15.28 (3.88%)             | 8.50 (2.53%)                               |
| Paternal prenatal<br>depression (n and<br>) <sup>a,f</sup>                              | 209.13<br>(3.27%)       | 39.13 (.73%)                      | 52.00 (17.16%)           | 15.00 (3.81%)             | 103.00 (30.65%)                            |
| Paternal postnatal<br>depression (n and<br>) <sup>a,g</sup>                             | 212.16<br>(3.31%)       | 31.00 (.58%)                      | 10.09 (3.33%)            | 69.00 (17.51%)            | 102.06 (30.38%)                            |
| Maternal prenatal<br>depression (n and<br>) <sup>a,f</sup>                              | 693.97<br>(10.84%)      | 512.59 (9.54%)                    | 57.59 (19.01%)           | 61.97 (15.73%)            | 61.81 (18.40%)                             |
| Maternal<br>postnatal<br>depression (n and<br>) <sup>a,g</sup>                          | 533.41<br>(8.33%)       | 387.72 (7.22%)                    | 37.00 (12.21%)           | 63.34 (16.08%)            | 45.34 (13.50%)                             |
| Maternal prenatal<br>anxiety (n and<br>) <sup>a,h</sup>                                 | 941.59<br>(14.70%)      | 708.97 (13.20%)                   | 73.53 (24.27%)           | 75.34 (19.12%)            | 83.75 (24.93%)                             |
| Maternal<br>postnatal anxiety<br>(n and n and %) <sup>a,i</sup>                         | 900.16<br>(14.06%)      | 658.88 (12.27%)                   | 67.00 (22.11%)           | 90.72 (23.03%)            | 83.56 (24.87%)                             |
| High total<br>problems in<br>offspring (n and<br>) <sup>a,i</sup>                       | 563.00<br>(8.79%)       | 436.00 (8.12%)                    | 42.00 (13.86%)           | 42.00 (10.66%)            | 43.00 (12.80%)                             |

| Factor                                                          | All sample<br>(N=6,404) | Non-anxious<br>group<br>(n=5,371) | Prenatal only<br>(n=303) | Postnatal only<br>(n=394) | Anxious-at-both-<br>times group<br>(n=336) |
|-----------------------------------------------------------------|-------------------------|-----------------------------------|--------------------------|---------------------------|--------------------------------------------|
| High behavioural problems in offspring (n and %) <sup>a,k</sup> | 728.00 (11.37%)         | 583.00 (10.85%)                   | 44.00 (14.52%)           | 54.00 (13.71%)            | 47.00 (13.99%)                             |
| High emotional problems in offspring (n and %) <sup>a,l</sup>   | 397.00 (6.20%)          | 306.00 (5.70%)                    | 38.00 (12.54%)           | 26.00 (6.60%)             | 27.00 (8.04%)                              |

**Note.**

<sup>a</sup> Significant difference between the four groups ( $F$  value or Pearson's Chi-squared test,  $p < .05$ ).

<sup>b</sup> Continuous score in the Crown-Crisp Experiential Index at the 18-week gestation assessment.

<sup>c</sup> Continuous score in the Crown-Crisp Experiential Index at the 8-week postnatal assessment.

<sup>d</sup> Education level was analysed in 5 categories of attainment, although only the percentage gaining a degree is presented here for ease of reading.

<sup>e</sup> I=professional occupations; II= managerial and technical occupations.

<sup>f</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 18-week gestation assessment.

<sup>g</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 8-week postnatal assessment.

<sup>h</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 18-week gestation assessment.

<sup>i</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 8-week postnatal assessment.

<sup>j</sup> Score in the top 10% in the total problems scale of the Revised Rutter Parent Scale for Preschool Children at 42 months.

<sup>k</sup> Score in the top 10% in either the conduct or hyperactivity (or both) scales of the Revised Rutter Parent Scale for Preschool Children at 42 months.

<sup>l</sup> Score in the top 10% in the emotional problems scale of the Revised Rutter Parent Scale for Preschool Children at 42 months.

Table 3.2 Paternal Anxiety and Child High (Top 10%) Emotional and Behavioural Problems at 42 Months, Unadjusted and Adjusted Models, With Odds Ratios and 95% Confidence Intervals

| Subscale of RRPSPC                     | Regression model | Non-anxious vs prenatal only     | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both times | Postnatal only vs anxious-at-both times |
|----------------------------------------|------------------|----------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Total problems (behavioural/emotional) | Unadjusted model | <b>1.82 [1.28, 2.53], p=.001</b> | 1.35 [.95, 1.87], p=.078      | <b>1.66 [1.17, 2.30], p=.003</b>     | 0.74 [.47, 1.17], p=.199        | 0.91 [.58, 1.44], p=.693               | 1.23 [.78, 1.94], p=.370                |
|                                        | Model 1          | <b>1.82 [1.29, 2.56], p=.001</b> | 1.34 [.96, 1.88], p=.085      | <b>1.69 [1.21, 2.36], p=.002</b>     | 0.74 [.47, 1.17], p=.195        | 0.93 [.59, 1.47], p=.756               | 1.26 [.80, 1.98], p=.321                |
|                                        | Model 2          | <b>1.66 [1.15, 2.38], p=.006</b> | 1.29 [.91, 1.84], p=.155      | 1.29 [.90, 1.84], p=.161             | 0.78 [.48, 1.26], p=.311        | 0.78 [.48, 1.27], p=.313               | 1.00 [.62, 1.61], p=.999                |
|                                        | Model 3          | <b>1.52 [1.07, 2.16], p=.018</b> | 1.13 [.80, 1.60], p=.481      | 1.34 [.95, 1.89], p=.099             | 0.74 [.46, 1.19], p=.213        | 0.88 [.55, 1.40], p=.585               | 1.18 [.74, 1.88], p=.480                |
|                                        | Model 4          | 1.36 [.94, 1.97], p=.097         | 1.04 [.72, 1.49], p=.845      | 1.03 [.67, 1.57], p=.901             | 0.76 [.47, 1.24], p=.272        | 0.75 [.45, 1.25], p=.271               | 0.99 [.60, 1.63], p=.970                |
| Behavioural problems*                  | Unadjusted model | 1.40 [.99, 1.92], p=.049         | 1.30 [.96, 1.75], p=.082      | 1.34 [.96, 1.82], p=.076             | 0.93 [.61, 1.44], p=.759        | 0.96 [.61, 1.50], p=.847               | 1.02 [.67, 1.56], p=.912                |
|                                        | Model 1          | 1.38 [.99, 1.93], p=.055         | 1.27 [.94, 1.71], p=.122      | 1.31 [.95, 1.80], p=.102             | 0.92 [.60, 1.41], p=.693        | 0.95 [.61, 1.48], p=.805               | 1.03 [.68, 1.57], p=.887                |
|                                        | Model 2          | 1.34 [.90, 1.81], p=.179         | 1.36 [.91, 1.71], p=.172      | 0.33 [.75, 1.49], p=.743             | 0.98 [.62, 1.55], p=.934        | 0.83 [.52, 1.33], p=.444               | 0.85 [.54, 1.33], p=.471                |
|                                        | Model 3          | 1.21 [.87, 1.70], p=.259         | 1.15 [.84, 1.56], p=.381      | 1.13 [.82, 1.57], p=.462             | 0.94 [.61, 1.46], p=.797        | 0.93 [.59, 1.46], p=.756               | 0.99 [.64, 1.51], p=.948                |

| Subscale of RRPSPC | Regression model | Non-anxious vs prenatal only        | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both times | Postnatal only vs anxious-at-both times |
|--------------------|------------------|-------------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Emotional problems | Model 4          | 1.17 [.83, 1.66], p=.377            | 1.10 [.80, 1.51], p=.557      | 1.03 [.70, 1.51], p=.894             | 0.94 [.60, 1.48], p=.790        | 0.88 [.55, 1.41], p=.590               | 0.93 [.59, 1.47], p=.763                |
|                    | Unadjusted model | <b>2.37 [1.63, 3.36], p&lt;.001</b> | 1.17 [.76, 1.74], p=.459      | 1.45 [.94, 2.14], p=.078             | <b>0.49 [.29, .83], p=.008</b>  | 0.61 [.36, 1.02], p=.062               | 1.24 [.71, 2.17], p=.457                |
|                    | Model 1          | <b>2.39 [1.66, 3.43], p&lt;.001</b> | 1.21 [.80, 1.83], p=.374      | <b>1.58 [1.04, 2.39], p=.030</b>     | <b>0.51 [.30, .86], p=.011</b>  | 0.66 [.39, 1.12], p=.121               | 1.31 [.74, 2.29], p=.352                |
|                    | Model 2          | <b>2.30 [1.59, 3.33], p&lt;.001</b> | 1.12 [.74, 1.72], p=.587      | 1.25 [.82, 1.91], p=.301             | <b>0.49 [.29, .84], p=.009</b>  | <b>0.54 [.32, .93], p=.026</b>         | 1.11 [.63, 1.97], p=.717                |
|                    | Model 3          | <b>2.02 [1.40, 2.92], p&lt;.001</b> | 1.00 [.66, 1.53], p=.994      | 1.18 [.78, 1.79], p=.440             | <b>0.50 [.29, .84], p=.010</b>  | <b>0.58 [.34, .99], p=.046</b>         | 1.18 [.67, 2.08], p=.573                |
|                    | Model 4          | <b>1.77 [1.20, 2.61], p=.004</b>    | 0.89 [.57, 1.38], p=.591      | 0.87 [.52, 1.44], p=.579             | <b>0.50 [.29, .87], p=.015</b>  | <b>0.49 [.27, .87], p=.015</b>         | 0.98 [.53, 1.79], p=.941                |

Note. The first group in each contrast was the reference group in the analyses. p-values have not been corrected for multiple-hypothesis testing.

Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father social class, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal and 8-week postnatal, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal and 8-week postnatal, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal and 8-week postnatal, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal and 8-week postnatal, maternal and paternal history of severe depression and other psychiatric problems).

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

\*Scale created by the authors, considering those who scored in the top 10% in the conduct and/or hyperactivity scales.

RRPSPC = Revised Rutter Parent Scale for Preschool Children.

### 3.3.2 Ninety-one-Month Outcomes

- 1) Data on the 91-month sample are reported in Table 3.3 (with missing values imputed via multiple imputation; Table D5, in Appendix D, provides non-imputed data). The four groups differed significantly in: number of other children in the family, paternal marital status, and maternal and paternal mental health variables. These variables were accounted for in the adjusted models.

Table 3.3 Descriptive Characteristics of the Sample Used in the Analyses Looking at the Outcomes at 91 Months (n = 5,426; Missing Values Have Been Imputed Via Multiple Imputation)

| Factor                                                                       | All sample<br>(N=5,426) | Non-anxious<br>group<br>(n=4,559) | Prenatal only<br>(n=259) | Postnatal only<br>(n=324) | Anxious-at -<br>both-times<br>group<br>(n=284) |
|------------------------------------------------------------------------------|-------------------------|-----------------------------------|--------------------------|---------------------------|------------------------------------------------|
| Father age (mean and SD)                                                     | 31.47 (5.46)            | 31.42 (5.41)                      | 31.33 (5.41)             | 31.57 (5.99)              | 32.21 (5.62)                                   |
| Number of other children (mean and SD) <sup>a</sup>                          | .74 (.88)               | .72 (.86)                         | .71 (.81)                | .80 (.93)                 | .95 (1.20)                                     |
| Paternal prenatal anxiety (mean and SD) <sup>a,b</sup>                       | 2.92 (2.68)             | 2.14 (1.80)                       | 8.12 (1.45)              | 4.17 (1.67)               | 9.23 (2.01)                                    |
| Paternal postnatal anxiety (mean and SD) <sup>a,c</sup>                      | 2.46 (2.53)             | 1.69 (1.53)                       | 3.31 (1.43)              | 7.40 (1.76)               | 8.44 (2.24)                                    |
| Paternal ed. level (n and % with degree) <sup>d</sup>                        | 1330.09 (24.51%)        | 1110.56 (24.36%)                  | 58.09 (22.43%)           | 84.00 (25.93%)            | 77.44 (27.27%)                                 |
| Paternal ethnicity (n and % White)                                           | 5337.47 (98.37%)        | 4487.03 (98.42%)                  | 253.88 (98.02%)          | 319.91 (98.74%)           | 276.66 (97.41%)                                |
| Paternal social class (n and % I and II) <sup>e</sup>                        | 2829.19 (52.14%)        | 2352.53 (51.60%)                  | 143.81 (55.53%)          | 166.78 (51.48%)           | 166.06 (58.47%)                                |
| Child sex (n and % females)                                                  | 2674.19 (49.28%)        | 2244.81 (49.24%)                  | 116.78 (45.09%)          | 173.59 (53.58%)           | 139.00 (48.94%)                                |
| Marital status of fathers (n and % married) <sup>a</sup>                     | 4689.50 (86.43%)        | 3982.22 (87.35%)                  | 211.66 (81.72%)          | 254.88 (78.67%)           | 240.75 (84.77%)                                |
| Past history of severe depression in fathers (n and %) <sup>a</sup>          | 296.31 (5.46%)          | 148.53 (3.26%)                    | 37.28 (14.39%)           | 44.69 (13.79%)            | 65.81 (23.17%)                                 |
| Past history of other psychiatric problems in fathers (n and %) <sup>a</sup> | 93.16 (1.72%)           | 48.13 (1.06%)                     | 8.97 (3.46%)             | 11.09 (3.42%)             | 24.97 (8.79%)                                  |

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| Factor                                                                       | All sample<br>(N=5,426) | Non-anxious<br>group<br>(n=4,559) | Prenatal only<br>(n=259) | Postnatal only<br>(n=324) | Anxious-at -<br>both-times<br>group<br>(n=284) |
|------------------------------------------------------------------------------|-------------------------|-----------------------------------|--------------------------|---------------------------|------------------------------------------------|
| Past history of severe depression in mothers (n and %) <sup>a</sup>          | 364.91 (6.73%)          | 285.06 (6.25%)                    | 21.00 (8.11%)            | 28.03 (8.65%)             | 30.81 (10.85%)                                 |
| Past history of other psychiatric problems in mothers (n and %) <sup>a</sup> | 116.00 (2.14%)          | 91.19 (2.00%)                     | <5 (<2.00%)              | 16.00 (4.94%)             | 6.63 (2.33%)                                   |
| Paternal prenatal depression (n and %) <sup>a,f</sup>                        | 174.09 (3.21%)          | 35.09 (.77%)                      | 39.00 (15.06%)           | 13.00 (4.01%)             | 87.00 (30.63%)                                 |
| Paternal postnatal depression (n and %) <sup>a,g</sup>                       | 169.16 (3.12%)          | 25.03 (.55%)                      | 7.13 (2.75%)             | 56.00 (17.28%)            | 81.00 (28.52%)                                 |
| Paternal depression at 73 months (n and %) <sup>a,h</sup>                    | 364.47 (6.72%)          | 194.00 (4.26%)                    | 32.22 (12.44%)           | 66.19 (20.43%)            | 72.06 (25.37%)                                 |
| Maternal prenatal depression (n and %) <sup>a,f</sup>                        | 547.59 (10.09%)         | 395.13 (8.67%)                    | 47.41 (18.30%)           | 50.50 (15.59%)            | 54.56 (19.21%)                                 |
| Maternal postnatal depression (n and %) <sup>a,g</sup>                       | 447.13 (8.24%)          | 324.50 (7.12%)                    | 32.00 (12.36%)           | 52.47 (16.19%)            | 38.16 (13.44%)                                 |
| Maternal depression at 73 months (n and %) <sup>a,h</sup>                    | 697.50 (12.85%)         | 541.03 (11.87%)                   | 43.03 (16.61%)           | 63.09 (19.47%)            | 50.34 (17.73%)                                 |
| Maternal prenatal anxiety (n and %) <sup>a,i</sup>                           | 732.44 (13.50%)         | 553.50 (12.14%)                   | 52.25 (20.17%)           | 59.50 (18.36%)            | 67.19 (23.66%)                                 |
| Maternal postnatal anxiety (n and n and %) <sup>a,j</sup>                    | 741.41 (13.66%)         | 536.41 (11.77%)                   | 59.00 (22.78%)           | 74.63 (23.03%)            | 71.38 (25.13%)                                 |
| Maternal anxiety at 73 months (n and n and %) <sup>a,k</sup>                 | 652.09 (12.02%)         | 499.78 (10.96%)                   | 39.56 (15.28%)           | 58.44 (18.04%)            | 54.31 (19.12%)                                 |
| Paternal anxiety at 73 months (n and n and %) <sup>a,k</sup>                 | 948.56 (17.48%)         | 554.75 (12.17%)                   | 90.66 (35.00%)           | 120.09 (37.07%)           | 183.06 (64.46%)                                |
| Any diagnosis (n and %) <sup>a,l</sup>                                       | 342.00 (6.30%)          | 265.00 (5.81%)                    | 20.00 (7.72%)            | 21.00 (6.48%)             | 36.00 (12.68%)                                 |
| Any behavioural disorder diagnosis (n and %) <sup>a,l</sup>                  | 227.00 (4.18%)          | 174.00 (3.82%)                    | 12.00 (4.63%)            | 15.00 (4.63%)             | 26.00 (9.15%)                                  |
| Any emotional disorder diagnosis (n and %) <sup>l</sup>                      | 148.00 (2.73%)          | 118.00 (2.59%)                    | 8.00 (3.09%)             | 9.00 (2.78%)              | 13.00 (4.58%)                                  |
| Any anxiety disorder diagnosis (n and %) <sup>l</sup>                        | 142.00 (2.62%)          | 113.00 (2.48%)                    | 8.00 (3.09%)             | 8.00 (2.47%)              | 13.00 (4.58%)                                  |

## Note.

<sup>a</sup> Significant difference between the four groups (F value or Pearson's Chi-squared test,  $p < .05$ ).

<sup>b</sup> Continuous score in the Crown-Crisp Experiential Index at the 18-week gestation assessment.

<sup>c</sup> Continuous score in the Crown-Crisp Experiential Index at the 8-week postnatal assessment.

<sup>d</sup> Education level was analysed in 5 categories of attainment, although only the percentage gaining a degree is presented here for ease of reading.

<sup>e</sup> I=professional occupations; II= managerial and technical occupations.

<sup>f</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 18-week gestation assessment.

<sup>g</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 8-week postnatal assessment.

<sup>h</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 73-month assessment.

<sup>i</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 18-week gestation assessment.

<sup>j</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 8-week postnatal assessment.

<sup>k</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 73-month assessment.

<sup>l</sup> Assessed via the Development and Wellbeing Assessment - Parent Questionnaire at the 91-month assessment.

- 2) The results of the unadjusted and adjusted models are presented in Table 3.4. The anxious-at-both-times group, compared to the non-anxious group, had significantly higher rates of any probable psychiatric diagnosis (unadjOR = 2.35, 95% CI [1.60, 3.37],  $p < .001$ ), any behavioural disorder diagnosis (unadjOR = 2.54, 95% CI [1.62, 3.84],  $p < .001$ ), and any anxiety disorder diagnosis (unadjOR = 1.89, 95% CI [1.00, 3.40],  $p = .035$ ). Rates of any psychiatric disorder and any behavioural disorder in the anxious-at-both-times group were also significantly higher than in the postnatal-only group. For behavioural disorders, rates were higher in the anxious-at-both-times than prenatal-only group.
- 3) When we controlled for the effects of sociodemographic variables (adjusted Model 1), child temperament (adjusted Model 2), maternal mental health (adjusted Model 3), and maternal and paternal mental health (adjusted Model 4), the patterns of the associations remained consistent, although were generally attenuated and some became statistically non-significant (see Table 3.4).
- 4) When we examined outcomes for male and female offspring separately, for males, similar patterns of difference to those at steps (2) and (3) emerged, but fewer significant associations were found for females (see Table D6 and Table D7, in Appendix D). Specifically, in female offspring, the anxious-at-both-times group,

compared to the non-anxious group, had higher rates of any psychiatric diagnosis and any anxiety disorder. For both outcomes, the associations remained significant in adjusted Model 1. No other significant differences emerged. In male offspring, similarly to the results for the entire sample, we found significantly higher rates of any psychiatric diagnosis and behavioural disorders in the anxious-at-both-times group, compared to the non-anxious group. These associations remained significant in all four adjusted models. Behavioural disorders were more common in the anxious-at-both-times, than in the prenatal-only group, and the associations remained significant in the adjusted Models 1, 3 and 4. Only for the adjusted Model 3, the anxious-at-both-times group had significantly higher rates of any diagnosis than postnatal-only group and, for the adjusted Models 3 and 4, the anxious-at-both-times group had significantly higher rates of behavioural disorders than postnatal-only group. No significant associations were found for emotional and anxiety disorders.

- 5) When we repeated the analyses in the subgroup of families where the biological father was still living with the family at the 3-year assessment, the patterns of significance remained consistent, with some small differences in the size and significance of the effects (see Table D8, in Appendix D).

Table 3.4 Paternal Anxiety and Child Psychiatric Diagnoses at 91 Months, Unadjusted and Adjusted Models, With Odds Ratios and 95% Confidence Intervals

| DAWBA diagnoses       | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious- at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious- at-both-times | Postnatal only vs anxious-at-both-times |
|-----------------------|------------------|------------------------------|-------------------------------|---------------------------------------|---------------------------------|-----------------------------------------|-----------------------------------------|
| Any disorder          | Unadjusted model | 1.36 [.82, 2.12], p=.207     | 1.12 [.69, 1.74], p=.621      | <b>2.35 [1.60, 3.37], p&lt;.001</b>   | 0.83 [.44, 1.57], p=.561        | 1.73 [.99, 3.13], p=.060                | <b>2.09 [1.20, 3.73], p=.010</b>        |
|                       | Model 1          | 1.34 [.83, 2.15], p=.231     | 1.09 [.69, 1.73], p=.714      | <b>2.30 [1.59, 3.34], p&lt;.001</b>   | 0.82 [.43, 1.54], p=.531        | 1.72 [.97, 3.07], p=.064                | <b>2.11 [1.20, 3.72], p=.009</b>        |
|                       | Model 2          | 1.27 [.79, 2.06], p=.321     | 1.03 [.65, 1.64], p=.905      | <b>1.99 [1.36, 2.91], p&lt;.001</b>   | 0.81 [.42, 1.54], p=.514        | 1.56 [.87, 2.80], p=.137                | <b>1.93 [1.09, 3.42], p=.024</b>        |
|                       | Model 3          | 1.21 [.74, 1.96], p=.445     | 0.91 [.57, 1.45], p=.685      | <b>1.98 [1.35, 2.91], p=.001</b>      | 0.75 [.39, 1.44], p=.388        | 1.64 [.91, 2.96], p=.099                | <b>2.19 [1.22, 3.90], p=.008</b>        |
|                       | Model 4          | 1.14 [.69, 1.88], p=.612     | 0.85 [.52, 1.40], p=.528      | <b>1.71 [1.04, 2.79], p=.033</b>      | 0.75 [.38, 1.46], p=.395        | 1.50 [.80, 2.81], p=.206                | <b>2.00 [1.08, 3.70], p=.027</b>        |
| Behavioural disorders | Unadjusted model | 1.22 [.64, 2.14], p=.508     | 1.22 [.68, 2.03], p=.464      | <b>2.54 [1.62, 3.84], p&lt;.001</b>   | 1.00 [.46, 2.22], p=.998        | <b>2.07 [1.05, 4.35], p=.043</b>        | <b>2.08 [1.09, 4.09], p=.029</b>        |
|                       | Model 1          | 1.20 [.66, 2.19], p=.547     | 1.18 [.69, 2.03], p=.550      | <b>2.48 [1.61, 3.82], p&lt;.001</b>   | 0.98 [.45, 2.14], p=.962        | <b>2.06 [1.01, 4.18], p=.045</b>        | <b>2.10 [1.09, 4.05], p=.027</b>        |
|                       | Model 2          | 1.15 [.63, 2.11], p=.653     | 1.12 [.65, 1.93], p=.685      | <b>2.09 [1.34, 3.25], p=.001</b>      | 0.97 [.44, 2.14], p=.949        | 1.82 [.89, 3.73], p=.103                | 1.86 [.96, 3.64], p=.068                |
|                       | Model 3          | 1.10 [.60, 2.02], p=.754     | 1.01 [.58, 1.75], p=.971      | <b>2.18 [1.40, 3.40], p=.001</b>      | 0.92 [.42, 2.02], p=.829        | 1.98 [.97, 4.04], p=.061                | <b>2.16 [1.11, 4.21], p=.024</b>        |

| DAWBA diagnoses     | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious- at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious- at-both-times | Postnatal only vs anxious-at-both-times |
|---------------------|------------------|------------------------------|-------------------------------|---------------------------------------|---------------------------------|-----------------------------------------|-----------------------------------------|
| Emotional disorders | Model 4          | 1.14 [.61, 2.14], p=.680     | 1.01 [.57, 1.79], p=.981      | <b>2.35 [1.34, 4.12], p=.003</b>      | 0.88 [.39, 1.98], p=.762        | 2.06 [.97, 4.38], p=.061                | <b>2.33 [1.15, 4.74], p=.019</b>        |
|                     | Unadjusted model | 1.20 [.53, 2.33], p=.624     | 1.08 [.50, 2.02], p=.836      | 1.81 [.96, 3.12], p=.048              | 0.90 [.34, 2.42], p=.825        | 1.51 [.62, 3.86], p=.372                | 1.68 [.71, 4.13], p=.240                |
|                     | Model 1          | 1.19 [.57, 2.46], p=.646     | 1.06 [.53, 2.10], p=.876      | 1.80 [1.00, 3.23], p=.051             | 0.89 [.34, 2.34], p=.815        | 1.51 [.62, 3.72], p=.366                | 1.70 [.71, 4.04], p=.230                |
|                     | Model 2          | 1.14 [.55, 2.36], p=.731     | 0.98 [.49, 1.96], p=.957      | 1.56 [.86, 2.82], p=.141              | 0.86 [.33, 2.28], p=.766        | 1.37 [.56, 3.39], p=.492                | 1.59 [.67, 3.80], p=.296                |
|                     | Model 3          | 1.06 [.50, 2.22], p=.882     | 0.80 [.40, 1.63], p=.540      | 1.42 [.77, 2.60], p=.264              | 0.76 [.28, 2.03], p=.582        | 1.34 [.53, 3.35], p=.534                | 1.77 [.73, 4.29], p=.209                |
| Anxiety disorders   | Model 4          | 0.89 [.41, 1.95], p=.778     | 0.71 [.34, 1.50], p=.374      | 0.93 [.41, 2.07], p=.852              | 0.80 [.29, 2.22], p=.665        | 1.04 [.38, 2.81], p=.944                | 1.30 [.50, 3.39], p=.593                |
|                     | Unadjusted model | 1.25 [.56, 2.44], p=.542     | 1.00 [.02, 1.93], p=.992      | <b>1.89 [1.00, 3.27], p=.034</b>      | 0.79 [.29, 2.19], p=.650        | 1.51 [.62, 3.86], p=.372                | 1.89 [.79, 4.85], p=.162                |
|                     | Model 1          | 1.24 [.60, 2.56], p=.569     | 0.98 [.47, 2.02], p=.948      | <b>1.88 [1.05, 3.40], p=.035</b>      | 0.79 [.29, 2.14], p=.642        | 1.52 [.62, 3.75], p=.358                | 1.93 [.79, 4.73], p=.150                |
|                     | Model 2          | 1.19 [.57, 2.49], p=.634     | 0.91 [.44, 1.90], p=.811      | 1.65 [.91, 2.99], p=.097              | 0.77 [.28, 2.08], p=.600        | 1.38 [.56, 3.41], p=.482                | 1.81 [.73, 4.44], p=.198                |
|                     | Model 3          | 1.10 [.52, 2.32], p=.800     | 0.73 [.35, 1.54], p=.410      | 1.46 [.79, 2.70], p=.224              | 0.66 [.24, 1.83], p=.429        | 1.33 [.53, 3.33], p=.545                | 2.00 [.80, 5.02], p=.139                |

| DAWBA diagnoses | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious- at-both- times | Prenatal only vs postnatal only | Prenatal only vs anxious- at-both- times | Postnatal only vs anxious-at-both- times |
|-----------------|------------------|------------------------------|-------------------------------|----------------------------------------|---------------------------------|------------------------------------------|------------------------------------------|
|                 | Model 4          | 0.96 [.44, 2.10], p=.916     | 0.69 [.32, 1.51], p=.356      | 1.08 [.49, 2.40], p=.842               | 0.72 [-.25, 2.06], p=.544       | 1.13 [.42, 3.06], p=.808                 | 1.56 [.58, 4.19], p=.374                 |

*Note.* The first group in each contrast was the reference group in the analyses. p-values have not been corrected for multiple-hypothesis testing.

Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, paternal anxiety in the Crown-Crisp Experiential Index at 73 months, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal and paternal history of severe depression and other psychiatric problems).

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

DAWBA = Development and Wellbeing Assessment - Parent Questionnaire.

### 3.3.3 Continuous Anxiety Scores as Predictors

When we conducted the analyses using continuous anxiety scores in fathers at prenatal and postnatal times as predictors, we found significant associations for all the child outcomes examined, at both 42- and 91-months. Table D9 (in Appendix D) provides the unadjusted and adjusted ORs.

## 3.4 Discussion

We believe that this is the first study to examine the impact of different timings of paternal perinatal anxiety (prenatal-only, postnatal-only, and anxiety both pre- and postnatally) on pre-schoolers' or children's mental health. Overall, our results indicate that paternal perinatal anxiety confers a risk for children's subsequent mental health, in line with our hypothesis and with the emerging body of evidence highlighting the importance of paternal mental health for child development (Barker et al., 2017; Challacombe et al., 2023; Ramchandani et al., 2008; Trepia et al., 2022; Zecchinato et al., 2024).

The risk pattern at 42-months was driven mainly by indirect (i.e., prenatal) exposure to paternal anxiety, in contrast with our hypothesis that direct exposure (i.e., postnatal anxiety only) is a greater risk than indirect exposure (Ramchandani et al., 2008). Specifically, compared to children with non-anxious fathers during the perinatal period, children with fathers anxious only prenatally were significantly more likely to present total and emotional difficulties. This suggests that, at 42-months, paternal prenatal anxiety might be necessary and sufficient to convey risk to children, while postnatal exposure alone might be unnecessary and insufficient for children to manifest mental health difficulties. These results could reflect the unmediated (e.g., genetic and epigenetic processes) and mediated (e.g., couple relationships, including foetal programming via an impact on maternal prenatal mental health; Van den Bergh et al., 2005) pathways through which expectant fathers can shape child development during the prenatal period (Cardenas et al., 2022). Crucially, the magnitude of the effect sizes and pattern

of associations remained consistent after accounting for sociodemographic variables, child temperament, maternal mental health (and paternal mental health, only for child emotional difficulties), highlighting the key relevance of paternal mental health, and anxiety specifically, independent from maternal mental health. The risk patterns remained generally consistent when male and female offspring were analysed separately.

The analyses looking at the impact of paternal anxiety on child psychiatric diagnoses at 91-months resulted in different patterns compared to outcomes at 42-months. Indeed, compared to children of non-anxious fathers, rates of offspring probable psychiatric disorders were only higher in children exposed to paternal anxiety both prenatally and postnatally. Specifically, children with fathers anxious at both times (pre- and postnatally) appeared to be at particular high risk of any psychiatric disorder and behavioural disorders, even after accounting for sociodemographic variables, child temperament, maternal mental health, and paternal mental health. This suggests that neither direct nor indirect exposure to paternal anxiety alone is sufficient to convey risk through to 91-months of age, but that both direct and indirect risk exposure may be necessary for older children to manifest mental health difficulties. At 91 months, offspring sex was important; for boys, the risk patterns were the same as those found for the entire sample, while smaller effects in magnitude were found for girls, for whom having a father anxious at both times resulted in significantly higher rates only of any anxiety disorders and any disorder, compared to those whose father was not anxious in the perinatal period. However, for female offspring the differences were not significant when adjusting for child temperament and parental mental health. At both 42 and 91 months, the findings remained generally consistent when we restricted the analyses to the subgroup of families where the biological father was still living with the family at the 3-year assessment.

The study has several strengths. It includes longitudinal data from a large, unselected population sample and long-term follow-ups, with assessments that spanned from before birth up to the age of seven years. We used well-validated measures to assess parental and offspring mental health, and reduced the risk of rater bias by using paternal self-reported measures of

psychopathology and maternal and/or professional ratings of child difficulties. The unique nature of the rich longitudinal data enabled us to conduct a large prospective study, incorporating prenatal and postnatal exposure data to begin to disentangle direct vs indirect mechanisms of intergenerational risk transmission. Further, we controlled for the effect of maternal mental health, child temperament, and key sociodemographic variables in our analyses (Zecchinato et al., 2024). Finally, we conducted sensitivity analyses to test any effect of child sex and of excluding families where the biological father was not present in the first three years of the child's life.

The study also has several limitations. For the analyses looking at both the 42- and 91-month outcomes, the numbers in each of the risk groups are small in the context of the whole sample and compared to the non-anxious group. This is reasonable and in line with Ramchandani et al. (2008), but limited the power of the study to find differences between the groups, especially between the three anxious groups. Second, other factors, that were not accounted for in our study, are likely to play a role in the association between paternal anxiety and child outcomes and in the risk transmission, including assortative mating (Smolen et al., 2023) and shared rater effects between mothers and fathers (Krasikova & LeBreton, 2012); it is also possible that child's characteristics influence paternal anxiety symptoms in the postnatal period, resulting in environmentally mediated transactional effects (Villarreal & Nelson, 2018). Additionally, we could not examine genetic confounds, and it is likely that shared genes, as well as other environmental stressors that have not been accounted for in our analyses, have played a role in the strength of the associations. Third, the possibility of collider effects should be considered; nevertheless, the models adjusted for maternal mental health and child characteristics showed patterns of significance and effect sizes consistent with the unadjusted models. Fourth, we were unable to use a diagnostic assessment of paternal anxiety, and set cut-off scores to identify anxious fathers. This means that a participant scoring just below the cut-off at one time point of interest and just above at the other may not have had significantly different psychopathological symptoms, but would be rated as non-anxious at one point and

anxious at the other. We addressed this by repeating the analyses using continuous paternal anxiety scores. The consistency of the results suggests that the use of cut-offs did not create artefactual findings. Fifth, our groups were created based on scores on a questionnaire repeated over a 6-month time gap. However, these time points are separated by a major life event (birth of a child and consequent transformation of the family system; Kluwer, 2010), which justifies these relatively close in time assessments of anxiety. Sixth, as expected for large observational studies (Wright et al., 2021), we encountered the issue of cohort attrition, and the covariates presented missing data, which can introduce potential bias in the results and compromise the study inferences. However, we handled missing data using multiple imputation via the multivariate imputation by chained equations algorithm, which is a recommended technique to manage missingness in clinical research (White et al., 2011). In terms of ethnicity, our sample comprises mostly White participants; hence, caution should be taken when interpreting and generalising the results to other populations, and future research should aim to include more diverse samples. Finally, analyses were not corrected for multiple testing, and results should be interpreted with some caution, and in terms of both effect size estimates and associated confidence intervals.

Our findings hold important clinical implications, highlighting the risk posed by paternal perinatal mental health, and anxiety specifically, to their offspring mental health, and adding to the evidence of the importance of identifying and treating fathers' mental health difficulties pre- and postnatally (Challacombe et al., 2023; Zecchinato et al., 2024). However, further research is needed i) to identify the precise mechanisms by which indirect and direct risk transmission occurs so as ii) to enable the development of preventive strategies and interventions to reduce risks for young children.

### **3.5 Conclusion**

This study built on the existing research focused on fathers' contribution to child development by testing the impact of the exposure to different timings of paternal perinatal

anxiety on children's subsequent psychological functioning. We took advantage of rich longitudinal data on paternal anxiety and offspring emotional and behavioural outcomes collected in a large UK-based birth cohort study (ALSPAC) and conducted a prospective study adopting a prenatal vs postnatal design. Although our design does not allow us to draw strong causal conclusions, we found that children whose fathers are anxious in the perinatal period, compared to children of non-anxious fathers, are more likely to present mental health difficulties at 42- and 91-months. This demonstrates that paternal perinatal anxiety is an important risk factor for adverse child outcomes, even after accounting for maternal mental health, child temperament, and key sociodemographic factors, and should not be overlooked in research and clinical practice.

# **Chapter 4 Promoting the Mental Health of Children with Anxious Parents: A Qualitative Investigation of Parents' Views and Needs**

## **Notes**

This Chapter was submitted as a research paper to *Child and Adolescent Mental Health* and is currently undergoing peer-review.

## **CRedit (Contributor Roles Taxonomy)**

Francesca Zecchinato: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review and editing

Jana Kreppner: Conceptualization, Project administration, Supervision, Writing – review & editing

Peter Bullard: Conceptualization, Formal analysis, Writing – review & editing

Sophie Painter: Formal analysis, Writing – review & editing

Manos Kumar: Conceptualization, Formal analysis, Writing – review & editing

Peter J. Lawrence: Conceptualization, Funding acquisition, Methodology, Project administration, Supervision, Writing – review & editing

## Abstract

Youth mental ill-health poses a burden on individuals and societies and is currently a widespread concern. Parental anxiety is a modifiable risk factor for the development of poor mental health in children, thus supporting anxious parents in preventing mental ill-health in their children can represent an effective strategy to limit this burden. Previous research has not investigated the type of support desired by anxious parents with young children. This study aimed to qualitatively explore what parents who have accessed an NHS talking therapy service for anxiety need from a service aimed at supporting them in minimising the potential negative impacts of parental anxiety on their preschool-aged children. Semi-structured interviews were conducted with 16 UK-based parents. Using reflexive thematic analysis, four themes were generated to summarise participants' views. "*There's just not enough support*" highlighted the current lack, in England, of a service that supports anxious parents in preventing their children's mental ill-health; "*It's not easy to find your way to help*" explored existing and potential barriers to service access; "*It's a balance*" collected the characteristics of an accessible and usable service to support parents in supporting their children; and "*Advertise it well*" focused on strategies to facilitate promotion and access to the service. The overarching theme, "*We just need more support for parents. Full stop.*", captured the urgent need for more support for anxious parents and for action to prevent child mental ill-health. Findings provide insights on characteristics of an adequate prevention service to promote the mental health of children with anxious parents, and can help direct future research, clinical, and policy efforts towards the development of accessible and acceptable prevention programmes.

**Keywords:** anxiety, child development, intergenerational transmission, parents, PPI, prevention.

## 4.1 Introduction

Mental ill-health is recognised as the primary threat to the health, wellbeing and productivity of young people (McGorry et al., 2024); it affects 10%-20% of children and young people (CYP) worldwide, with a steady increase in prevalence and impact registered over the past two decades and a major surge driven by the COVID-19 pandemic and its aftermath (McGorry et al., 2024). The latest follow-up report to the United Kingdom Mental Health of Children and Young People survey indicates that 1 in 6 (16.7%) children aged 7 to 16 years and 1 in 4 (25.7%) children aged 17 to 19 years have a probable mental disorder (Newlove-Delgado et al., 2022). Meta-analytic evidence shows that mental disorders are already established by age 14 in 35% of individuals, and by age 25 in 63% of individuals (Solmi et al., 2022), and are associated with long-term negative impacts in multiple life domains, including educational attainment, social relationships, mental and physical health, and overall quality of life (Mojtabai et al., 2015; Weitkamp et al., 2013). Currently, mental ill-health accounts for at least 45% of the overall burden of disease in those aged 10 to 24 years (Patton et al., 2016), and is a leading cause of disability in this age group globally (Castelpietra et al., 2022). However, only 2% of global health budgets are allocated to addressing it (McGorry et al., 2024). Further, only a small minority of CYP in need currently accesses adequate care (Gandhi et al., 2022; McGorry et al., 2024), and a recent analysis of more than 71,000 children's health records in England showed that vulnerable children (e.g., from deprived areas, with social services involvement for current concerns) are systematically more likely to be refused access to National Health Service (NHS) Child and Adolescent Mental Health Services compared to their more advantaged peers (Mannes et al., August 2024).

Effective prevention of mental ill-health in youth could help minimise these negative impacts and limit the burden that mental disorders pose over the life course on individuals, societies, and health-care systems, making it one of the best investments in health and social policy reform (McGorry et al., 2024).

The identification of modifiable risk factors is crucial to implement effective prevention strategies (Lawrence et al., 2020b). Although genetics play an important role in the development of mental disorders, environmental factors, including parental mental health, parenting practices, and the support available to families (Reupert et al., 2022), are critical (Ahmadzadeh et al., 2019).

Parental psychopathology is one of the most robust modifiable risk factors for the development of mental health difficulties in CYP. Compared to other children, children whose parents have a mental disorder are more likely to develop mental health difficulties themselves (Dean et al., 2010; Reupert et al., 2022), with research showing that 36% of children accessing child mental health services have a parent with a mental illness (Campbell et al., 2021). Anxiety disorders are the most prevalent psychiatric condition in adults worldwide, with an estimated prevalence of 4.4% in 2021 (IHME, 2024), and higher rates among new parents (Dennis et al., 2017; Leiferman et al., 2021). Moreover, the scientific literature consistently shows that parental anxiety is associated with the development of emotional and behavioural problems in their children (e.g., Lawrence et al., 2019a; Trepiak et al., 2022; Zecchinato et al., 2024).

The first years of life are a particularly sensitive period for the exposure to environmental adversity (Cowan et al., 2016), making preschool-age children of anxious parents a high-risk population. Prevention efforts should target these parents to improve their mental health and promote healthier developmental outcomes in their children. However, the prevention of mental ill-health among children of anxious parents has received limited research attention and, in England, there are currently no clinical NHS services aimed at preventing the negative impacts that parental anxiety can have on their children (Reardon et al., 2018). Therefore, there is an urgent need to understand how to best support parents with lived experience of anxiety in the promotion of their children's mental health.

Elucidating anxious parents' needs and providing them with adequate support in the promotion of their children's positive mental health is crucial. Qualitative approaches allow for in-depth investigation of phenomena directly from individuals with lived experience (Braun &

Clarke, 2013) and have been recognised as important to understand barriers and facilitators to access by the UK Medical Research Council (Craig et al., 2008). Prior qualitative studies have focused on perceived barriers and facilitators to access *treatment* for common mental health problems (Radez et al., 2021a), including child anxiety difficulties (Reardon et al., 2018), to access targeted anxiety *prevention* programmes (Lawrence et al., 2020b), and to participate in preventive research (Festen et al., 2014), from the perspective of both parents and adolescents who had themselves experienced mental ill-health. These studies have identified the following key factors affecting service access: limited mental health knowledge and negative perceptions of help-seeking, lack of awareness of needing professional help and of the support available, perceived or feared social stigma and embarrassment, as well as structural barriers associated with services (e.g., lack of adequate services, high demand of existing services; Festen et al., 2014; Lawrence et al., 2020b; Radez et al., 2021a; Reardon et al., 2018). The needs of parents who have lived experience of anxiety disorders *and* preschool children have not been rigorously examined with respect to supporting their young children's mental health.

In light of this evidence, the current study aimed to qualitatively explore what parents who have i) experienced anxiety disorders and ii) preschool children would want and need from a service aimed at supporting them in the prevention of the potential negative impacts of parental anxiety on their young children (in terms of support needed, service characteristics, facilitators and barriers to access). By doing this, we hoped to 1) provide useful insights on what a prevention service to promote the mental health of children with anxious parents could look like, and 2) help direct future research, clinical and policy efforts towards the development of prevention programmes that are accessible and acceptable.

## **4.2 Methods**

### **4.2.1 Participants**

Parents were eligible to participate if they were 18 years old or above, had at least one preschool-age child (between 18 months old and 5 years old, who had not yet started primary school), had lived experience of an anxiety disorder or impairment caused by anxiety, had recovered from the impact of anxiety or felt that anxiety no longer had a significant impact on their life, had completed an NHS psychological therapy for anxiety, were resident in the UK, and were able to have an online interview (e.g., had a device with internet access). We expected that participants would be able to communicate in English. However, because we aimed to recruit a diverse participant group, we recognized potential barriers to participation such as being a native speaker of a language other than English. Therefore, if non-English speaking individuals expressed interest in participating, we planned to use independent interpreters and informed potential participants of this option in the participant information sheet.

We anticipated that we would need to recruit 10-15 parents, based on sample sizes from previous qualitative studies with comparable research aims (e.g., Lawrence et al., 2020b; Reardon et al., 2018). Nevertheless, recruitment was governed by the concept of information power (Malterud, Siersma, & Guassora, 2016) and ended once the research team determined that enough data of sufficient quality and depth had been collected to answer the research questions.

### **4.2.2 Procedure and Materials**

The study received ethical approval from the NHS Research Ethics Committee (IRAS ID: 331503) and the University of Southampton's Psychology Research Ethics Committee (ERGO ID: 84929).

The study was advertised within NHS Trusts across England (Birmingham and Solihull Mental Health NHS Foundation Trust, Isle of Wight NHS Trust, Dorset Healthcare University NHS

Foundation Trust, involved as gatekeepers, and Southern Health NHS Foundation Trust, which was the lead NHS site and circulated the study within their internal potential participant pool), as well as social media (Facebook, Twitter), parenting groups, nurseries, charities, and the University of Southampton. We targeted parents who had already completed an NHS psychological therapy for anxiety problems (e.g., generalised anxiety disorder, social anxiety disorder) to collect the views of individuals already familiar with NHS mental health services and perhaps motivated to access help to prevent their children developing mental ill-health and engage with promotion of their children's mental health. Purposive sampling (Palinkas et al., 2015) was used to recruit participants who met our inclusion criteria and allowed us to approach a diverse range of parents from different locations and backgrounds across England. The study was open to recruitment from October 2023 to June 2024.

Study adverts (see Appendix E, section E.1) invited interested parents to contact the research team via email or scan the QR code included in the poster. Details of the study were provided on the participant information sheet (accessed on Qualtrics; potential participants were directed to it either directly, if they scanned the QR code, or F.Z. sent them a link via email). Qualtrics was also used to collect demographic information (age, sex, ethnicity, household characteristics, number of offspring, offspring age, type of psychological therapy received). To ensure that potential participants met the inclusion criteria, and reduce the threats to data quality and integrity (Jones et al., 2021), we stated in the participant information sheet that we would ask participants to show a proof of access to an NHS talking therapy service (e.g., confirmation letter for therapy sessions, email reminders for therapy appointments) at the interview stage. Participants were considered ineligible if unable to provide a proof of NHS service access. Participants were also asked to provide their email address on the Qualtrics form, used by F.Z. to arrange the interview with eligible participants. Informed consent was obtained from all participants via a consent form accessed on Qualtrics. Eligible participants then took part in a one-to-one semi-structured interview with F.Z.

conducted online via Microsoft Teams. Interviews were video-recorded and lasted between 24 and 50 minutes (mean average of 36 minutes).

Interviews followed an indicative topic guide (see Appendix E, section E.2), developed by the research team in collaboration with experts by experience (patient and public involvement [PPI] advisory group), who provided consultation from study design through to dissemination. The topic guide comprised a series of open-ended questions grouped into three related areas: (1) questions about the parent's thoughts on preventing their anxiety being a problem for their preschooler (would they want a service with this aim? When would the help be most useful? What would make this service accessible and usable?); (2) questions about any concerns for their children's mental health that are related to their own anxiety; and (3) questions about barriers to access help to prevent negative outcomes in, and promote the mental health of, their children. Details of the involvement of the PPI advisory group are reported in Table 4.1, following the short form of the Guidance for Reporting Involvement of Patients and the Public Checklist 2 (Staniszewska et al., 2017).

After the interview, all participants received a £25 gift voucher for their participation. Interviews were then transcribed verbatim by F.Z., at which point any identifying information was removed, and pseudonyms were assigned.

Table 4.1 Guidance for Reporting Involvement of Patients and the Public Checklist 2 - Short Form (GRIPP2-SF)

| Section and Topic | Item                                                                 | Explanation                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1: Aim            | Report the aim of PPI in the study                                   | To ensure that the research focused on priorities relevant for people who may benefit from it; to ensure that the study material was appropriate and sensitive to the intended audience; to ensure that the results and discussion were understandable by, and relevant for, the intended audience.                                                                                                              |
| 2: Methods        | Provide a clear description of the methods used for PPI in the study | Two parents with lived experience of anxiety and an NHS clinical service lead were recruited to the research team to assist at all stages of the study. They were involved in refining the focus of the research questions, in refining the study material (advertisements, participant information sheet, consent form, indicative topic guide used during the interviews), in analysing the data (refining the |

| Section and Topic                   | Item                                                                                                                                      | Explanation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |                                                                                                                                           | themes and naming them), and in discussing the findings. The PPI advisory group members contributed to edits of the paper and are coauthors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 3: Study results                    | Outcomes - Report the results of PPI in the study, including both positive and negative outcomes                                          | <p>PPI contributed to the study in several ways, including:</p> <ul style="list-style-type: none"> <li>• Considering their experience as parents with lived experience of anxiety or as clinicians, the PPI group members reflected and shared their opinions regarding the value of the study and important aspects to consider (e.g., language used), as well as potential implications (e.g., relevance for prevention and intervention programmes, not only in the context of anxiety) and limitations of the study (e.g., need to collect the needs of underrepresented groups);</li> <li>• Shaping the study material to ensure that it was acceptable and understandable for the targeted audience, and not alarming or triggering;</li> <li>• Helping develop the indicative topic guide, suggesting areas to investigate and providing feedback to ensure that the questions and language used were adequate and sensitive</li> </ul>                                                                                            |
| 4: Discussion and conclusions       | Outcomes - Comment on the extent to which PPI influenced the study overall. Describe positive and negative effects                        | <p>PPI in this study was effective and influenced important aspects of the study, improving the acceptability of the study for the participants and the relevance and overall quality of the research conducted.</p> <p>However, there were limitations. The broad research question was already decided; hence, this limited the possibility for the PPI members to shape the aim of the study. One PPI member only took part in the initial stages (first meeting aimed at refining the research questions and initial feedback on the study material), while another member only took part in the final stages (theme refinement, discussion and final edits). At each stage, time for feedback was quite limited, due to the timeframe in which the study needed to be completed, and it was not always possible for all the researchers and PPI members to meet at the same time. In future studies, scheduling these meetings in advance or allowing more time for the research to be completed might overcome this limitation.</p> |
| 5: Reflections/critical perspective | Comment critically on the study, reflecting on the things that went well and those that did not, so others can learn from this experience | <p>PPI was embedded into all the stages of the research process for this study. The PPI members provided valuable inputs for the study and felt that the experience of being part of this project was overall positive and rewarding. Allowing more time for each stage of the study, including initial training on conducting mental health research, could help PPI members better familiarise with the study aims, material, results and discussion, allowing an even more in-depth and meaningful involvement. PPI consultations prior to establishing the research questions for the study would also be key to ensure that the research focus is relevant for and important to the intended audience.</p>                                                                                                                                                                                                                                                                                                                           |

Note. PPI = patient and public involvement.

The table is an adapted version of the GRIPP2-SF (Staniszewska et al., 2017), with an explanation of how each item was addressed in the study in the last column, rather than the page number of where the item is reported in the manuscript. The table provides evidence of how PPI was embedded in the present study.

#### **4.2.3 Data Analysis**

Qualitative data were analysed using reflexive thematic analysis (RTA; Braun & Clarke, 2006, 2022), an approach that involves the systematic identification and organisation of patterns of meaning across a dataset. RTA was chosen as it fits with the purpose of addressing a research question related to people's experiences and views, acknowledges the active role of the researcher in interpreting the experiences of participants as they make sense of them, and has established parameters to facilitate high-quality, robust analyses (Braun & Clarke, 2022). We took an inductive approach to data analysis, meaning that the analysis was data-driven and closely linked to participants' accounts. We followed the Reflexive Thematic Analysis Reporting Guidelines (RTARG; Braun & Clarke, 2024) to ensure a comprehensive, rigorous, conceptually and methodologically coherent report of our qualitative study.

RTA is theoretically flexible; it has no specific epistemological or ontological framework (Braun & Clarke, 2022). Given our aim to understand parents' views and needs to prevent their preschooler's mental ill-health, we adopted an experiential qualitative orientation. Experiential qualitative approaches are focused on meaning and experience, on how people make sense of their realities, their worldviews, and frames of reference (Braun & Clarke, 2022). We adopted a critical realist ontological perspective, which recognises the concept of truth and reality (realism) and that the world is knowable, whilst acknowledging that there is no one objective reality, because human practices always shape how we experience and know it (relativism) (Braun & Clarke, 2013, 2022). Our epistemic approach was phenomenological, which is centred on the study of first-person lived experience and treats subjective experiences as a valid and meaningful focus of inquiry (Braun & Clarke, 2022).

The authors actively reflected on how their own experiences, values, knowledge, and identities shaped the study, including knowledge and experience of conducting research into

child mental health and intergenerational transmission of psychopathology (F.Z., J.K., P.J.L.), working in the NHS as a clinical psychologist and psychological therapist (P.B., P.J.L.), being a parent (J.K., M.K., P.B., P.J.L., S.P.), and personal experiences with mental ill-health (F.Z., J.K., M.K., P.J.L., S.P.). This was achieved through group supervisory meetings and PPI meetings for the duration of the project, as well as reflexive diaries (see Appendix E, section E.3, for reflexivity statement).

Qualitative data analysis was flexibly guided by the six-phase process (Braun & Clarke, 2022). In phase 1, F.Z. familiarised themselves with the dataset by listening to the recordings, reading the transcripts multiple times, and making notes. During phase 2, F.Z. conducted a systematic coding of the dataset, focusing on data most relevant to the research question. Coding was done at a semantic and latent level and was data-driven (inductive). This phase involved a recursive process, with multiple rounds of reading and comparisons within and across transcripts, and insights sought from P.J.L. and J.K. Phase 3 involved generation of initial themes; F.Z. reflected on the dataset as a whole and began to collate codes into candidate themes and, where relevant, subthemes. In phases 4 and 5, P.J.L., J.K. and the PPI advisory group (M.K., P.B., S.P.) aided F.Z. in reviewing and refining codes and candidate themes, before developing names and definitions. Phase 6 involved the final write-up, with inputs from the whole author team. To promote trustworthiness, we addressed the four criteria outlined by Lincoln and Guba (1988), namely credibility (i.e., we followed Braun and Clarke's 6-phase process), dependability (via the specification of our theoretical assumptions and orientations, and adherence to the RTARG), confirmability (i.e., we used reflexivity and involved our PPI advisory group throughout the study process), and transferability (via reflexivity and purposive sampling). We did not use specific computer software to facilitate analysis.

## **4.3 Results**

### **4.3.1 Participant Characteristics**

Twenty-six parents completed the online demographic questionnaire and consent form on Qualtrics. However, 10 of them were ineligible, did not reply to the researcher to book the online interview, or were declined on the basis of purposively sampling on key demographic characteristics, resulting in the final dataset of 16 participants (11 mothers and 5 fathers). Thirteen parents were recruited through social media, nurseries, schools and parent groups, and three were recruited through NHS trusts. Participants were 24-42 years old ( $M = 33.69$ ,  $SD = 4.40$ ) and the majority (62.50%) were White British (see Table 4.2 for participant characteristics).

Table 4.2 Participant Demographics

| Participant's pseudonym | Parent | Parent's age (years) | Parent's ethnicity      | Parent's highest education level <sup>a</sup> | Parent's current employment status <sup>b</sup> | Household income <sup>c</sup> | Number of children | Age of children | Household type       | Marital status       | Recruitment source        | NHS access                             |
|-------------------------|--------|----------------------|-------------------------|-----------------------------------------------|-------------------------------------------------|-------------------------------|--------------------|-----------------|----------------------|----------------------|---------------------------|----------------------------------------|
| Alice                   | Mother | 32                   | White British           | 5                                             | 6                                               | 3                             | 1                  | 2Y              | Two-parent household | married              | Social media              | Before and after child was born        |
| Benjamin                | Father | 35                   | Black British           | 4                                             | 4                                               | 3                             | 2                  | 5y; 2y          | Two-parent household | married              | Social media              | Before and after children were born    |
| Chloe                   | Mother | 36                   | White British           | 5                                             | 3                                               | 7                             | 2                  | 2y; 4y          | Two-parent household | married              | Social media              | Before and after children were born    |
| David                   | Father | 31                   | Mixed White and African | 4                                             | 3                                               | 3                             | 2                  | 7y; 3y          | Two-parent household | married              | Social media              | Before children were born              |
| Emma                    | Mother | 39                   | White British           | 4                                             | 2 and 3                                         | 4                             | 1                  | 3Y              | Two-parent household | married              | Social media              | Before child was born                  |
| Fiona                   | Mother | 26                   | White British           | 5                                             | 4                                               | 2                             | 1                  | 1,5y            | Two-parent household | married              | Social media              | After child was born                   |
| Grace                   | Mother | 29                   | White British           | 4                                             | 5                                               | 1                             | 3                  | 10y; 8y; 1,5y   | Two-parent household | domestic partnership | Parent group              | After children were born               |
| Holly                   | Mother | 24                   | White British           | 5                                             | 3                                               | 3                             | 1                  | 1,5y            | Two-parent household | married              | Social media              | Before child was born (while pregnant) |
| Ivy                     | Mother | 31                   | White other             | 5                                             | 1                                               | 4                             | 1                  | 2y and 3months  | Two-parent household | married              | University of Southampton | Before child was born                  |

| Participant's pseudonym | Parent | Parent's age (years) | Parent's ethnicity | Parent's highest education level <sup>a</sup> | Parent's current employment status <sup>b</sup> | Household income <sup>c</sup> | Number of children | Age of children  | Household type                                           | Marital status       | Recruitment source | NHS access                      |
|-------------------------|--------|----------------------|--------------------|-----------------------------------------------|-------------------------------------------------|-------------------------------|--------------------|------------------|----------------------------------------------------------|----------------------|--------------------|---------------------------------|
| Jessica                 | Mother | 32                   | White British      | 5                                             | 4                                               | 3                             | 2                  | 2y; 9months      | Two-parent household                                     | married              | Social media       | After children were born        |
| Kevin                   | Father | 42                   | White Irish        | 4                                             | 4                                               | 4                             | 1                  | 3y               | Two-parent household                                     | married              | Nursery            | Before child was born           |
| Laura                   | Mother | 35                   | White British      | 4                                             | 4, but currently on maternity leave             | 4                             | 2                  | 3,5Y; 1Y         | Two-parent household                                     | married              | Nursery            | Before children were born       |
| Martha                  | Mother | 29                   | Black British      | 4                                             | 3                                               | 4                             | 1                  | 19months         | Two-parent household                                     | married              | NHS trust          | After child was born            |
| Nadia                   | Mother | 42                   | White other        | 5                                             | 4                                               | 6                             | 4                  | 12y; 10y; 7y; 4y | Two-parent household                                     | domestic partnership | Nursery            | After preschool child was born  |
| Owen                    | Father | 36                   | White British      | 3                                             | 4                                               | 3                             | 2                  | 2,5Y; 5Y         | I live on my own and the children live with their mother | separated            | NHS trust          | After children were born        |
| Philip                  | Father | 40                   | White British      | 3                                             | 2                                               | 3                             | 1                  | 3Y               | Two-parent household                                     | married              | NHS trust          | Before and after child was born |

**Note.**

<sup>a</sup> 1 = Completed GCSE/CSE/O-levels or equivalent (at school till aged 16); 2 = Completed post-16 vocational course; 3 = A-levels or equivalent (at school till aged 18); 4 = Undergraduate degree or professional qualification; 5 = Postgraduate degree.

<sup>b</sup> 1 = Student; 2 = Self-employed; 3 = In part-time employment; 4 = In full-time employment; 5 = Unable due to disability.

<sup>c</sup> 1 = Less than £16,000 a year (£310 a week); 2 = £16,000-£29,999 a year (£310-£569 a week); 3 = £30,000-£59,999 a year (£569-£1149 a week); 4 = £60,000-£89,999 a year (£1500-£1729 a week); 5 = £90,000-£119,999 a year (£1730-£2299 a week); 6 = More than £120,000 a year (£2300 a week); 7 = Prefer not to say.

### 4.3.2 Themes

A thematic map of the results is shown in Figure 4.1. The views and needs of our participants regarding the prevention of mental ill-health in their children are explored through four themes ("There's just not enough support": Absence of a service; "It's not easy to find your way to help": Barriers to prevention; "It's a balance": What parents need from a service; and "Advertise it well": Strategies to facilitate access) and one overarching theme ("We just need more support for parents. Full stop."). The overarching theme is presented first and is seen as infiltrating the other themes and subthemes, that are presented in the order in which parents may experience them.

#### 4.3.2.1 Overarching Theme. "We Just Need More Support for Parents. Full Stop."

Overall, parents repeatedly stressed the need of more support for parents who have (had) anxiety difficulties and the crucial importance of acting to prevent child mental ill-health (*"it's so important to be able to prevent it [child anxiety and poor mental health]"*, Grace).

Participants highlighted that being a parent is hard and comes with difficulties and concerns that need to be recognised and adequately addressed. Specifically, parents struggling with their mental health face unique challenges and *"deserve a huge amount of priority"* (Nadia), and that is where it is worth investing resources and support:

*"If you want to invest in children, you need to invest in mothers, parents."* (Nadia)

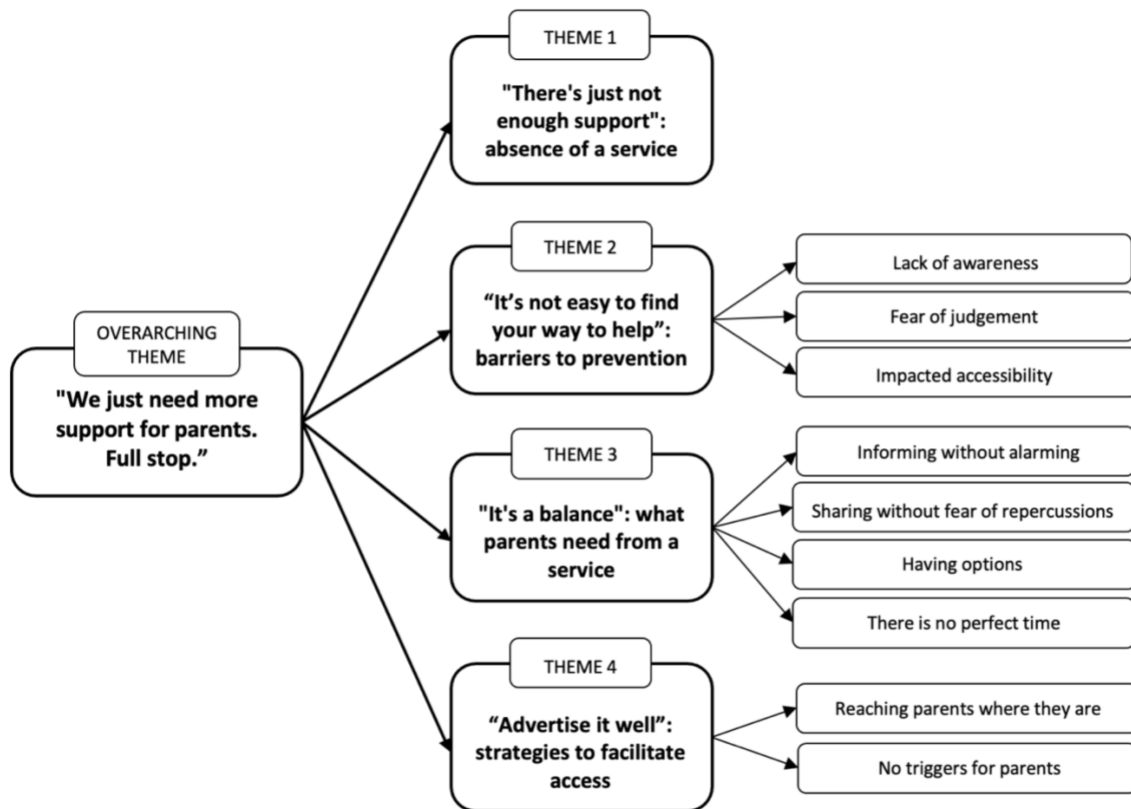


Figure 4.1 Thematic Map

As recognised by our participants, this is key considering that parents experiencing mental ill-health can have their caring abilities negatively affected (*"Anxiety affected every single part of my parenting up until I was on the correct medication and having therapy"*, Grace), thus potentially impacting children's development, and that this represents a main concern for parents.

*"And sometimes you go, 'oh, my word, like, what's wrong with my child? Like, have I done this? Is it my fault?'"* (Alice)

*"It's not great to be responsible for small children and to be struggling emotionally precisely because the parenting relationship in it is all about emotions [...] and so it's difficult to see that [children] wouldn't be affected by a parent who's like anxious or depressed or whatever."*

(Nadia)

#### 4.3.2.2 Theme 1: "There's Just Not Enough Support": Absence of a Service

This theme focuses on parents' experiences with the existing mental health services in England, ultimately highlighting that currently there is not an NHS service that adequately supports anxious parents in the promotion of their children's mental health, and that these parents' needs and concerns about their young children remain unaddressed or unmet.

*"There's just not enough support... like health visitors and people like that, no one promotes [young children's mental health] enough."*

(Grace)

In this regard, participants emphasised that the mental health of parents, of their children, and their potential associations, are not systematically discussed in perinatal parenting classes, and that new parents are not provided with the knowledge and tools that would be useful after the child is born, to face potential emotional or behavioural difficulties manifesting in their children. It was stressed that particular attention regarding the discussion of mental health, and the impact of parental mental health on child development, should be given to those parents who have struggled with their mental health in the past (*"if there's somebody like me who has a history of it, the conversation could be a bit different."*, Laura).

#### 4.3.2.3 Theme 2: "It's Not Easy to Find Your Way to Help": Barriers to Prevention

Central to parents' reporting was the identification of existing or potential barriers to accessing help and preventive services. These are explored through three subthemes.

**Lack of Awareness.** Participants highlighted lack of awareness of at least three relevant issues as a key barrier to access prevention. These included: (a) awareness of having an impact on their child's mental health (*"Some parents might not be aware of what impact it [parental clinical anxiety] can have on the child"*, Fiona); (b) awareness of needing help to support their child (*"If people don't realise that they need the help, they might not actually actively go and seek it."*, Emma); and (c) awareness of the help and resources available to support parents promote their children's mental health, and of the ways to reach out for help (*"My fear is that a*

*lot of people would be left out because they don't have the capacity to reach out for help. It's quite difficult to reach out for help.*", Ivy).

**Fear of Judgement.** Participants reported that key obstacles to accessing preventive services for parents include the *"element of shame [related to] admitting that you need help as a parent"* (Alice), the guilt that may be triggered by the realisation of having negatively impacted your child, and the fear of being labelled as a *"bad parent"* (Grace) (*"You don't want to think that if you sign up to something, you get flagged on a system as 'I'm anxious therefore I could be a risk to my child'."*, Laura). A particularly recurring concern among parents was their fear that reaching out for help or accessing a mental health service would raise concerns among social services, with the risk of *"having the child taken away"* (Alice, Grace). Participants also reported that group settings themselves could become *"toxic"* (Nadia), adding pressure and worries to parents, together with the concern of being judged or *"ridiculed"* (Owen) by other parents.

#### **Impacted Accessibility.**

*"You can't sign somebody off from their parenting duties, right? Can you really take a break from that?"* (Nadia)

Our participants highlighted that having caring responsibilities makes it difficult to engage with programmes, impacting the time available to attend services as well as the ability to implement mental health advice. Participants identified that experiencing financial difficulties and lack of childcare may be particularly relevant barriers to accessing preventive services.

#### **4.3.2.4 Theme 3: "It's a Balance": What Parents Need from a Service**

This theme focuses on what parents who have (had) anxiety difficulties would need from a service aimed at supporting them to promote their children's mental health. These needs are explored through four subthemes, linked by a common thread related to the importance of finding a *"balance"* (Laura).

**Informing Without Alarming.** Core to our participants' reports was the importance for the service to share evidence-based information that is relevant for parents, educating parents on the impact that their mental health might have on their children's development (*"Making people*

*aware that your mental health could have an impact on your children's mental health", Laura)* and on the mechanisms of risk transmission, informing on the reality of having a baby and on *"signs to look out for"* (David), addressing parents' concerns and unrealistic expectations, and teaching coping strategies and tools that can ultimately help parents help their children.

*"I think it'd be really helpful to know how to tackle things in advance [before the development or manifestation of a mental health problem]. [...] if I was pre-armed with that sort of thing, that would be helpful." (Laura)*

This knowledge should be promoted without alarming parents, but rather normalising and validating their experiences (*"I suppose just making it very normal [...] You don't want to make the people feel that they're abnormal"*, Jessica).

**Sharing Without Fear of Repercussions.** Parents emphasised the need of creating a *"safe environment"* (Alice) where discussions around mental health and parenting struggles are encouraged and where parents feel comfortable disclosing, without feeling judged and without fearing negative repercussions for them or their children.

*"I think it's very important [for health professionals] to send a reassuring message around those things, because - and I'm very mental health positive - but I still kind of felt a bit... 'Should I tell them this [mental health difficulties] or should I keep it to myself? Because I don't know what they're gonna do with this information'? Like, what's gonna happen? Will they have someone check on me because they're like, 'oh, this person might do whatever', you know." (Ivy)*

Some participants suggested that this supportive and safe space could be achieved if the service consisted of rather informal (to avoid an over-medicalisation of the process and the fear of having a track record of having been referred to a service) and *"regular check-ins"* (Laura), which would help build relationships and create a *"sense of belonging"* (Benjamin) to a supportive *"community"* (Holly).

**Having Options.** When considering the format of the service, parents expressed the importance of flexibility and having a range of options available, including the possibility of bringing or involving their children and accommodating individuals' circumstances and need.

Generally, participants recognised that an online service would be particularly convenient for parents, but at the same time an in-person service could be beneficial to create a supportive network and reduce the feelings of isolation.

*"In person is always better, just because that helps build relationships between people. But online is a really useful tool as well. And you wouldn't want people to miss out just because they couldn't come in person for whatever reason. So maybe having different sessions, because I think it wouldn't work as well if it was like mixed." (Holly)*

**There is No Perfect Time.** Participants expressed different opinions regarding when a preventive service would be most helpful, ranging from prenatally (*"the earlier the better"*, Fiona; *"not everyone has to, but it's having the option to access it before you've had your child"*, Martha) to the preschool years. It was also flagged that pregnant mothers are already *"bombarded"* (Nadia) with information, so for some parents it might be overwhelming to receive additional, potentially worrying, information at that stage.

*"You don't want to increase people's anxiety or depression by emphasising the fact that, you know, on top of everything else, they're falling short as a parent. But at the same time, you do want to give them help when they themselves worry about those things. I think that's a really tricky balance." (Nadia)*

Overall, most participants indicated that help should be readily available when parents are concerned and *"feel the need"* (Philip), or when a professional identifies the need for additional support.

#### 4.3.2.5 Theme 4: “Advertise it Well”: Strategies to Facilitate Access

This theme focuses on potential strategies that participants identified to facilitate access to preventive services and relates to the way services should be advertised.

**Reaching Parents Where They Are.** Efforts should be made to *“find people at the places where they are”* (Laura), carefully considering that often *“people who need it the most might not access [help]”* (Holly).

Parents and experts by experience indicated ways in which the service could be effectively promoted, including sharing leaflets via social media, workplaces, nurseries, libraries, churches, community leaders. GPs, health visitors, midwives and mental health professionals were also suggested to be in a good place to signpost such services, particularly considering the trusting relationship that has been likely already established with the parent.

**No Triggers for Parents.** Attention should be paid to the words used to promote the service (*“The way the information is relayed to people [is key].”* Ivy), clearly communicating that the aim is to help parents and their children thrive (*“you’re joining something to be proactive about your children’s mental health, [...] we’re prioritising children’s mental health”*, Laura), and that *“there’s nothing wrong with you for accessing the service. If anything, it’s good.”* (Martha).

*“Maybe not having it as a ‘stopping your poor mental health affecting children’ but presenting it in a way that was about creating positive and really good well-being for yourself so that you can create good well-being for your children. And you know, because we can pass on positive things as well. We can pass on positive coping strategies. And I think that’s really the key to overcome these barriers”* (Holly)

## 4.4 Discussion

In this study, we sought to understand how to best support anxious parents to promote good mental health in their young children. Considering the high prevalence of anxiety disorders among parents (Dennis et al., 2017; Leiferman et al., 2021), and the risk for subsequent mental

ill-health posed to their children (Lawrence et al., 2019a; Zecchinato et al., 2024), this represents an area of key research and clinical relevance that has not been explored in previous studies. We examined the views, experiences and needs of parents who have completed an NHS talking therapy for anxiety-related difficulties and with at least one preschool-age child via semi-structured qualitative interviews, and understood parents' accounts through four themes (covering the available services in England, barriers to access to prevention programmes, anxious parents' needs, and facilitators to access) and one overarching theme (that parents need more support).

Overall, this study clearly illustrates the need to take action to provide better and more accessible and acceptable support to parents who have experienced mental health disorders, and anxiety specifically, recognising the crucial role that parents play in their children's developmental outcomes (overarching theme). This imperative resonates with the call to action advocated by the Lancet Psychiatry Commission on youth mental health (McGorry et al., 2024), where, in order to tackle the youth mental health crisis, it is recommended to invest in prevention and early intervention programmes that target modifiable risk factors, including parental mental illness.

When discussing their needs to promote their young children's mental health, parents highlighted that, currently, there is an absence of such services, and that anxious parents' concerns remain unaddressed or unmet (Theme 1). Based on theory and research, we would expect that a programme targeting parental modelling of anxiety and controlling behaviours may be effective (e.g., Ginsburg et al., 2015; Thirlwall & Creswell, 2010), although more studies investigating the causal mechanisms of risk transmission specifically from fathers to preschool-age children are needed. Parents identified several existing or potential barriers to accessing prevention programmes, that should be considered when planning initiatives to support parents in supporting their children (Theme 2). These include: parents' lack of awareness of i) the risk posed by their anxiety to their child's mental health, ii) needing help to support their child, and iii) the help available; fear of being judged as inadequate parents and facing negative

consequences because of their anxiety, including raising concerns among social services; and impacted accessibility due to caring responsibilities. The barriers identified in our study are consistent with the findings of previous studies (Festen et al., 2014; Lawrence et al., 2020b; Radez et al., 2021a), and highlight the importance of educating parents who experience mental health difficulties regarding early signs of poor mental health among children and the sensitive issue of intergenerational risk transmission. Indeed, similar to previous research (Festen et al., 2014), although most parents reported concerns about their children's mental health, they often did not perceive a direct link between their own anxiety symptoms and their children's development. Key for parents was also the fear of being labelled as unfit parents and the stigma associated with needing mental health support for themselves or their children. Indeed, despite the extensive efforts to raise mental health awareness and destigmatise mental illness in the last two decades, stigma around mental illness remains a widespread problem (Foulkes & Andrews, 2023) and currently represents a major obstacle to prevention and early intervention (McGorry et al., 2024).

In terms of balancing their needs (Theme 3), parents emphasised the importance for a service to provide knowledge about the potential impact of their mental ill-health without causing excessive worries among parents; offer an informal safe space supporting discussions around mental health concerns and where parents feel part of a community; and recognise and flexibly accommodate parent-specific needs, such as bringing children and having online options. Although there was no consensus around an optimal time to receive support to promote children's mental health, parents highlighted the importance of easy and prompt access, consistent with previous research in which other potential service users identified systemic-structural aspects of services as relevant for accessing mental health support (Geist, 2004; Reardon et al., 2017).

To facilitate access (Theme 4), parents recommended to promote services widely, e.g., via social media, to reach as many parents as possible, as well as involving community leaders, midwives, and (mental) health professionals. Parents also discussed the importance of

carefully considering the language used to advertise the service. Considering the sensitive focus of the service, which could potentially worry parents with lived experience of anxiety, the advertisement should emphasise the goal of promoting children's mental health and equipping parents with knowledge and strategies to help their children thrive, rather than preventing problems.

### **4.4.1 Strengths, Limitations and Clinical Implications**

This study has several strengths. We ensured methodological quality following Braun and Clarke's 6-step process for data analysis (Braun & Clarke, 2022) and reporting our research in accordance with the Reflexive Thematic Analysis Reporting Guidelines (RTARG; Braun & Clarke, 2024), and promoted trustworthiness by adhering to the four criteria outlined by Lincoln and Guba (1988). Experts by experience provided consultation throughout the study, adding value to the research question, data analysis, and interpretation of the results. Our dataset comprises both mothers and fathers, which is important considering that fathers are often under-represented in research concerning the intergenerational transmission of psychopathology (Zecchinato et al., 2024). Our sample reflects some diversity in terms of ethnicity and socioeconomic status.

Our first limitation is that, despite our efforts to recruit a diverse sample, the views expressed by our participants may not be representative for the broader population of anxious parents. However, it is important to highlight that this was an exploratory study designed to examine the needs of parents already familiar with NHS mental health services and motivated to access help to engage with promotion of their children's mental health. We do not assume that our findings will generalise to a wider population of anxious parents. Future research should investigate the specific experiences of other ethnic and socioeconomic groups, who may have different needs and experience additional barriers to access mental health services (Mian, Eisenhower, & Carter, 2015). Second, we did not confirm with participants our final themes; however, seeking participant confirmation of the results is seen as a realist practice

and is not advised in RTA approaches (Braun & Clarke, 2022); moreover, experts by experience were involved in data analysis and interpretation.

## **4.5 Conclusion**

This qualitative study explored the needs of mothers and fathers who have (had) an anxiety disorder with regard to the promotion of their preschool-age children's mental health. Overall, parents consistently emphasised the need for more support, pointing the absence of an adequate NHS service in England; identified existing and potential barriers and facilitators to accessing preventive programmes; and shared their perspectives on what an accessible and acceptable service to help parents support their children should entail. The findings of this study have important theoretical and clinical implications. Theoretically, they contribute to the literature promoting the importance of targeted prevention programmes, informing what would facilitate their accessibility and acceptability to anxious parents, thus helping direct future research and policy efforts. Clinically, the findings emphasise the need to promote awareness among anxious parents regarding the promotion of mental health in their children, providing useful insights on prevention strategies that could be extended to other clinical domains.

## Chapter 5 General Discussion

Mental ill-health among CYP is a concerning issue in societies worldwide and is currently recognised as an international health priority (McGorry et al., 2024). Moreover, although effective treatments exist, the majority of CYP in need does not access adequate mental health care (Gandhi et al., 2022; McGorry et al., 2024). This may be linked to several factors, including difficulties in recognising signs of poor mental health, reluctance to disclose mental health difficulties and seek help because of fears of negative social consequences and stigma (Aguirre Velasco et al., 2020; Radez et al., 2021a; Radez, Reardon, Creswell, Orchard, & Waite, 2021b; Reardon, Harvey, & Creswell, 2020), and structural barriers, such as lack of adequate services as well as high demands and poor accessibility of existing services (Radez et al., 2021a; Reardon et al., 2020; Reardon et al., 2018). In England specifically, mental health services are struggling to keep up with the increased demand for care, resulting in long waiting lists and delayed treatments (British Medical Association, 2024; National Audit Office, 2023). Crucially, if left untreated, mental health problems are likely to crystallise and have long-lasting pervasive impacts on individuals' lives (Castelpietra et al., 2022; Neufeld, 2022). Prevention efforts directed at groups at higher risk of developing a mental illness (i.e., targeted prevention) can offer a solution to limit the increasing rates of mental illness in CYP and its associated burden (Arango et al., 2018; McGorry et al., 2024). However, to achieve this, it is key to understand who these vulnerable populations are, identifying the risk factors for CYP mental ill-health (Arango et al., 2018). In this thesis, I focused specifically on the risk posed by parental anxiety, considering its high prevalence (Dennis et al., 2017; Leiferman et al., 2021) and the body of evidence showing its associations with offspring mental ill-health (e.g., Ahmadzadeh et al., 2021; Lawrence et al., 2019a; Micco et al., 2009; Trepia et al., 2022). However, the existing literature on parental anxiety and child mental health outcomes presents several limitations (summarised above, 1.5) that hinder the ability develop effective preventive strategies. These include a limited knowledge of the role played by fathers and of the mechanisms involved in the transmission of risk for mental illness

from fathers to their children, and a lack of understanding of how to support parents with a history of mental illness in preventing mental ill-health among their children.

This thesis sought to address some of these knowledge gaps, specifically regarding: 1) the risk posed by paternal anxiety to their offspring and 2) the needs of anxious parents in the context of promoting their children's mental health.

In this final chapter, I will summarise the key findings from the studies presented in the three empirical chapters (Chapter 2-4) and, considering the findings collectively, review them in the context of the broader literature presented in Chapter 1; I will highlight the studies' limitations, discuss the implications of the findings for research and clinical practice, and indicate directions for future research stemming from the evidence provided here.

### **5.1 Summary of the Key Findings**

*Research question 1: What is the magnitude of the association between paternal anxiety and offspring emotional and behavioural problems?*

In Chapter 2, I presented the results of a systematic review and meta-analysis (Paper 1) examining the associations between paternal anxiety (disorders, trait and state symptoms) and emotional and behavioural outcomes of offspring from infancy to adulthood (mean age of the included samples ranging from 10.81 months to 27.41 years), including 98 studies and 54,998 individual participants. I conducted five distinct, but partially overlapping, meta-analyses, looking at combined emotional and behavioural offspring outcomes, as well as behavioural only, emotional only, anxiety only, and depression only outcomes. The results indicate that paternal anxiety is significantly associated with all the offspring mental health outcomes examined with small and small-to-medium effect sizes. I also tested the potential moderating effect of several sociodemographic and study-level variables, finding a significant effect of the method used to assess psychopathology in offspring and of the rater of offspring outcomes across all the moderation analyses for which data were analysable. Specifically, associations were weaker when the assessment of offspring outcomes relied on a diagnostically-based

categorical approach, and stronger when the assessment relied on a continuous measure of symptoms, and the strongest associations were found when fathers rated their offspring's emotional and behavioural difficulties. Although different interpretations are possible (as discussed in Chapter 2, section 2.4), these findings overall suggest that the methods used to design studies, and collect and analyse data, matter, highlighting the importance of collecting information from multiple informants and via different methods to obtain a complete picture of offspring's functioning. No significant moderating effect was found in any of the meta-analyses for the method used to assess paternal anxiety, the biological relatedness between father and offspring, the type of the association (cross-sectional vs prospective), the time lag between the assessments, and the age of the offspring, suggesting that these variables do not significantly affect the strength of the association between paternal anxiety and offspring mental health.

*Research question 2: Is paternal perinatal anxiety prospectively associated with child mental health difficulties and what are the mechanisms of risk transmission?*

In Chapter 3, I presented the results of a prospective study (Paper 2) using the ALSPAC cohort aimed at examining the impact of the exposure to paternal perinatal anxiety at different timings (prenatally-only, postnatally-only, and both pre- and postnatally) on children's subsequent emotional and behavioural difficulties at 42 and 91 months. Further, in an attempt to isolate the father-specific contribution, several variables were accounted for in the analyses, including key sociodemographic characteristics, paternal and maternal current and past mental health, and child temperament. Different patterns of associations emerged at the two assessment times. At 42 months, risk was driven mainly by prenatal exposure to paternal anxiety, which contrasted my hypothesis that exposure to postnatal anxiety would confer greater vulnerability to adverse mental health outcomes in offspring. This suggests that paternal prenatal anxiety might be necessary and sufficient to convey risk of total (i.e., emotional and behavioural problems) and emotional difficulties to children at 42 months. Moreover, the effects remained significant after accounting for sociodemographic variables, child temperament, maternal mental health (and paternal mental health, only for child emotional

difficulties). At 91 months, the findings were in line with the hypothesis of a greater cumulative risk conferred by exposure to paternal anxiety both pre- and postnatally: neither prenatal nor postnatal exposure alone was sufficient to convey risk, and both prenatal and postnatal exposure to paternal anxiety appeared to be necessary to significantly increase the risk for adverse mental health outcomes (i.e., probable psychiatric disorders) in children. Specifically, children whose fathers were anxious pre- and postnatally were found to be at increased risk of any psychiatric disorder and behavioural disorders, even after accounting for sociodemographic variables, child temperament, maternal mental health, and paternal mental health. Taken together, the findings from this study suggest that paternal perinatal anxiety is a unique risk factor for child mental ill-health, even after accounting for maternal mental health, paternal mental health, child temperament, and key sociodemographic factors, and should thus not be overlooked in research and clinical practice. However, the variation by child age (i.e., 42 and 91 months) of the pattern of findings with respect to the distinct effects dependent on the timing of paternal anxiety (e.g., prenatally only, postnatally only, or both pre- and postnatally) would benefit from further research.

*Research question 3: What do anxious parents need to promote their children's mental health?*

Considering the extant body of research on the effects of maternal anxiety on their children's mental health (e.g., Barker et al., 2011; de Rosnay et al., 2006; Ginsburg et al., 2015; Rogers et al., 2020a; Stein et al., 2014; Thirlwall & Creswell, 2010), together with the findings of my two studies (Chapter 2 and Chapter 3), the next task was to explore anxious parents' views on what they identify as helpful to support their children's mental health. In Chapter 4, I presented the results of a qualitative study (Paper 3) that explored the needs of mothers and fathers who have (had) an anxiety disorder and their views on the promotion of their preschool-age children's mental health. Overall, parents consistently emphasised the need for more support, highlighting the absence of an adequate NHS service in England, identifying existing and potential barriers and facilitators to accessing preventive programmes, and sharing their

perspectives on what an accessible and acceptable service to help parents support their children should look like. The key barriers to access reported by parents were: 1) their own unawareness of having an impact on their children's mental health, of needing help to support their children, and of the help available; 2) fear of judgement and stigma; and 3) limited accessibility due to caring responsibilities. A service designed to support anxious parents in helping their children should provide a safe space where open discussions around mental health, parental struggles, and concerns are encouraged. It should promote information on the sensitive topics of intergenerational transmission of mental health difficulties and the early signs of mental health problems in children, offering validation of parents' experiences rather than judgment. The aspect of avoiding triggering or alarming parents was particularly critical for the participants interviewed, who emphasised that when advertising the service, efforts should be made to frame it as a proactive approach to supporting the child, rather than a necessary measure to prevent mental illness caused by the parent's anxiety.

Importantly, the research questions addressed in the three studies presented in this thesis were shaped and refined by experts by experience (a PPI advisory group that included parents with lived experience of anxiety and an NHS clinical service lead), and, in Paper 3 (presented in Chapter 4), the PPI advisory group was involved throughout the entire research process (e.g., defining the aims, designing the interview topic guide, analysing and interpreting the findings). The PPI group members provided valuable input to the research that I have conducted, and I believe that their involvement enhanced the value, relevance, and impact of the studies for the intended audience. The group members reported that their participation in the research was both positive and rewarding.

## **5.2 Contributions to the Promotion of Mental Health Among Children with Anxious Parents**

The overall aim of this thesis was to advance the promotion of mental health among at-risk children. As discussed in Chapter 1, extensive literature exists in support of the importance of parental mental illness for child development (e.g., Campbell et al., 2021; Dean et al., 2010; McLaughlin et al., 2012; Reupert et al., 2022). Anxiety disorders are highly prevalent among parents and can increase the vulnerability to mental ill-health among their offspring (e.g., Ahmadzadeh et al., 2021; Jami et al., 2021; Lawrence et al., 2019a). However, my literature review in Chapter 1 highlighted that the field presents some important knowledge gaps: fathers have received limited research attention, our understanding of the impact of paternal anxiety, particularly in the perinatal period, for subsequent child mental health is lacking, and the needs of anxious parents regarding the promotion of their children's mental health have not been investigated.

In the next paragraphs, I will discuss the contributions of the present work in the context of the broader literature.

### **5.2.1 Fathers Matter**

At a broad level, the empirical studies presented in this thesis, particularly Paper 1 and Paper 2, add quantitative evidence to the emerging body of literature highlighting the importance of paternal mental health, both perinatally and postnatally, for child development. The results reported Chapter 2 (Paper 1) and in Chapter 3 (Paper 2) are in line with existing systematic reviews and meta-analyses that examined the associations between paternal psychopathology and offspring mental health outcomes (Connell & Goodman, 2002; Cui et al., 2020; Kane & Garber, 2004; Sweeney & MacBeth, 2016; Trepia et al., 2022) and prospective studies that investigated the impact of paternal psychopathology on subsequent child mental health (e.g., Challacombe et al., 2023; Ramchandani et al., 2005; Ramchandani et al., 2008).

For a long time, the focus has been almost exclusively on mothers, who were perceived as the primary caregiver, while fathers were regarded as having only minor or secondary roles in shaping their children's development (Bögels & Phares, 2008; Lamb, 2000; Lamb, 2010). This contributed to a problematic tendency to occasionally blame mothers for the difficulties experienced by their children (Strawn & Peris, 2024) and led to only a partial understanding of parental influences on the risk of psychopathology in children (e.g., Feldman, 2023; Fisher et al., 2021; Ramchandani & Psychogiou, 2009; Strawn & Peris, 2024).

Taken together, the current evidence adds strength to the recent discussions around the need to include and account for the contribution of paternal mental health when considering child development, because excluding fathers means neglecting a key contributor to child (and family) health (Cardenas et al., 2022; Feldman, 2023; Fisher et al., 2021). This is especially important in present times and societies, where fathers have assumed increasingly more involved roles in caregiving activities (e.g., Cabrera et al., 2000; Cabrera et al., 2018; Strawn & Peris, 2024).

### **5.2.2 Paternal Anxiety is a Risk Factor for Child Mental Health**

Paper 1 and Paper 2 specifically focused on the risk posed by paternal anxiety for their offspring's mental health.

To my knowledge, only one other meta-analysis to date has examined paternal anxiety and offspring mental health outcomes (i.e., Trepia et al., 2022). The small and small-to-medium effect sizes found in the meta-analyses presented in Chapter 2 (Paper 1) for the association between paternal anxiety and offspring mental health difficulties are comparable with the results of the meta-analysis by Trepia et al. (2022) on the association between paternal and child trait anxiety. However, Paper 1 extended the finding from Trepia et al. (2022) in several ways: 1) assessments of paternal anxiety trait symptoms, state symptoms and disorders were included (and not only trait anxiety symptoms); 2) emotional (including, but not limited to, anxiety and depression) and behavioural symptoms and disorders in offspring were

considered; 3) no age limits for the offspring were set when searching the electronic databases, thus the meta-analyses in Paper 1 are not restricted to child outcomes, but consider outcomes in offspring from infancy to adulthood. The significant associations found between paternal anxiety and offspring emotional ( $r = 0.15$ , 95% CI [0.12, 0.18],  $n = 52,327$ ) and behavioural ( $r = 0.19$ , 95% CI [0.13, 0.24],  $n = 10,958$ ) problems support the principle of multifinality in developmental psychopathology (Cicchetti & Rogosch, 1996), indicating that paternal anxiety may confer vulnerability for a range of mental health difficulties among their offspring. However, the study does not allow to draw causal inferences and it is possible that offspring to father influences are also at play (Villarreal & Nelson, 2018). Specifically, having a child with emotional and/or behavioural difficulties, or a mental illness, can place significant strain on parents' mental health, increasing their vulnerability to developing mental health conditions themselves (Campbell et al., 2021; Gross, Shaw, & Moilanen, 2008; Meltzer, Ford, Goodman, & Vostanis, 2011; Villarreal & Nelson, 2018). The findings of Papers 1 and 2 do not suggest an increased risk specific to *anxiety* among the offspring of anxious parents, as theorised by Bögels and Perotti (2011). Instead, the unique, evolutionary based role of fathers in fostering children's autonomy and exploration of the external world (Bögels & Perotti, 2011; Paquette, 2004) may be negatively affected by paternal anxiety, potentially increasing the vulnerability of children with anxious fathers to both emotional and behavioural difficulties. However, Papers 1 and 2 did not consider the impact of paternal social anxiety disorders and particular parenting behaviours (challenging parenting and overinvolvement), which were the focus of the model proposed by Bögels and Perotti (2011) and of the studies supporting the model (e.g., Majdandžić et al., 2014; Möller et al., 2015; Möller et al., 2016).

Finally, the societal and cultural shifts in family structures over recent decades may have blurred the traditionally distinct roles of fathers and mothers. Fathers were historically seen as providing 'external' protection (e.g., confronting the outside world, offering a secure base for exploration), while mothers were viewed as offering 'internal' protection (e.g., nurturing,

comforting, feeding, and soothing; Bögels & Perotti, 2011; Paquette, 2004). These changes may have altered the unique influences that fathers and mothers have on child development.

The impact of paternal anxiety on offspring emotional and behavioural difficulties was further confirmed by the findings of Paper 2 (presented in Chapter 3). Moreover, while in the meta-analyses included in Paper 1 it was not possible to test the effect of maternal mental health and other key potential moderators (e.g., SES, ethnicity/race, child temperament) on the associations between paternal anxiety and offspring outcomes, in Paper 2 these variables were accounted for in the analyses. Thus, Paper 2 provides initial evidence of the unique contribution of paternal anxiety in the perinatal period for subsequent adverse child mental health, adding to the literature emphasising the importance of paternal perinatal mental health (e.g., Cardenas et al., 2022; Challacombe et al., 2023; Ramchandani et al., 2008). Further, while in Paper 1 offspring sex was found to moderate only the association between paternal anxiety and offspring depression outcomes, in Paper 2 different patterns of significance in male and female offspring at the 91-month assessment were found. Specifically, the analyses considering offspring outcomes at 91 months showed that, compared to male children with non-anxious fathers during the perinatal period, male children with anxious fathers both pre- and postnatally had significantly higher rates of any emotional and behavioural disorder and behavioural only disorders, also in the adjusted models, while this significant effect was not present for female children. For female children, the effects were overall smaller in magnitude; female children with anxious fathers both pre- and postnatally had significantly higher rates of any anxiety disorder and any disorder compared to female children with non-anxious fathers in the perinatal period, but the differences did not remain significant when adjusting for child temperament and parental mental health. Hence, it is possible that among older children, male offspring are particularly vulnerable to paternal perinatal anxiety.

#### **5.2.2.1 Mechanisms of Risk Transmission**

The results in Paper 2 indicate that exposure to paternal prenatal (at 18 weeks gestation) anxiety (i.e., indirect exposure) may be both necessary and sufficient to convey increased risk of

mental health difficulties among preschool-age children. These findings could reflect not only an impact on child development via genetic and epigenetic mechanisms, but also a mediated impact via influences on maternal mental health and the couple relationship (Cardenas et al., 2022; Fisher et al., 2021; Ramchandani & Psychogiou, 2009), which can in turn affect the baby stress biology in utero, as proposed by the foetal programming hypothesis (Barker, 1995; Barker et al., 2011; Monk et al., 2019; Van den Bergh et al., 2005). The significance of paternal prenatal anxiety for subsequent child mental health outcomes reported in Paper 2 is in contrast to the findings by Capron et al. (2015) on the same cohort, where no significant associations between paternal prenatal anxiety (also at 18 weeks gestation) and adverse outcomes in offspring, but at 18 years of age, were reported. Crucially, it is likely that the salience of the influence of paternal mental health and parenting on child development decreases in strength over the years, with parents playing a less central role in older children's mental health (Palmer, Woolgar, Carter, Cartwright-Hatton, & Challacombe, 2023; Schepman et al., 2011). Indeed, even in Paper 2, paternal prenatal anxiety was not sufficient to significantly increase risk for mental health difficulties among children at 91 months of age. Instead, at 91 months, both prenatal and postnatal exposure to paternal perinatal anxiety were necessary to significantly increase the risk of psychiatric disorders among children. Overall, the effect sizes found in Paper 2 when comparing the likelihood of any mental health difficulty at 42 months (unadj OR = 1.66, 95% CI [1.17, 2.30]) and any probable psychiatric diagnosis at 91 months (unadj OR = 2.35, 95% CI [1.60, 3.37]) among children exposed to paternal anxiety both pre- and postnatally vs children whose fathers were not anxious perinatally were smaller than the effect sizes reported in the same comparison groups by Ramchandani et al. (2008) (total problems at 42 months: unadj OR = 3.55, 95% CI [2.07, 6.08]; any psychiatric disorder at 91 months: unadj OR = 2.54, 95% CI [1.19, 5.41]). In Ramchandani et al. (2008), the same design and same cohort as Paper 2 were used to test the effect of exposure to paternal pre- and postnatal depression on subsequent child mental health. However, the analyses in my Paper 2 were adjusted for some key variables, including maternal anxiety and child temperament, that were not accounted for in the study by

Ramchandani et al. (2008). The fact that the significance of the associations between paternal anxiety and child mental health remained after accounting for putative confounding variables highlights the possibility of a unique contribution of paternal perinatal anxiety for child development.

### 5.2.3 Anxious Parents Need More Support to Help Their Children

*“...because we can pass on positive things as well. We can pass on positive coping strategies. And I think that's really the key.”* (Holly, mother interviewed in the study presented in Chapter 4)

Paper 1 and Paper 2 show that paternal anxiety is a risk factor for child emotional and behavioural difficulties, hence fathers as well as mothers need to be considered when planning and implementing preventive strategies to promote better child mental health. As emphasised by Holly, one of the mothers interviewed in the qualitative study presented in Paper 3 (Chapter 4), parents who have experienced difficulties with anxiety should not be seen only as risks: they can become a support factor if equipped with adequate information and strategies to help their children thrive. Consequently, it is key to understand how to support anxious mothers and fathers in promoting the mental health of their children, exploring their needs and perspectives. This was the aim of Paper 3, where the main theme highlighted by parents was indeed the need of more support. Previous qualitative and quantitative studies have identified systemic, structural, and logistical barriers in existing mental health services for children and adults (e.g., financial costs, transportation difficulties, lack of time, limited availability of professional help, excessive waiting times; Radez et al., 2021a; Reardon et al., 2020; Reardon et al., 2018). However, in England, there are currently no clinical NHS services aimed at preventing the negative impacts that parental anxiety can have on their children. Although other services offered to new parents may be available via charities, local authorities, or community-based groups, they are not designed specifically to support anxious parents and may be difficult to access considering that they are not centrally provided via the NHS.

Consistent with the available literature (e.g., Festen et al., 2014; Reardon et al., 2018), in Paper 3, anxious parents reported that a lack of knowledge regarding the signs to look out for in their children, the risks posed by parental anxiety for their offspring, and the ways to get help may represent important barriers to service access. The fear of being judged as inadequate parents was also central in parents' reports, highlighting that stigma surrounding mental illness remains a significant issue, in line with existing evidence (e.g., Campbell & Poon, 2020; Festen et al., 2014; Wilson & Crowe, 2009).

*“If you want to invest in children, you need to invest in mothers, parents.”* (Nadia, mother interviewed in the study presented in Chapter 4)

Adding to the recent discussions regarding the need to invest in the prevention of mental ill-health in CYP (McGorry et al., 2024), parents' reports in Paper 3 emphasised the importance of prioritising parents' mental health. Parents struggling with their mental health face unique challenges (Wilson & Crowe, 2009), which can adversely affect their parenting abilities and, consequently, the development of their children. In Paper 3, parents discussed the characteristics of an acceptable and accessible service to help them support their children, pointing to the necessity of providing a safe space where mental health and parenting challenges can be openly discussed, where parents' concerns are addressed, and where the focus is on promoting child wellbeing. Additionally, they highlighted the importance of paying attention to the words used to avoid alarming messages about the consequences of their anxiety for their children. Although Paper 3 specifically focused on the needs of anxious mothers and fathers with regard to the prevention of their children's mental ill-health, it evidences the value of collecting the views of potential service users to design accessible and acceptable programmes, that adequately meet parents' support needs (Barnes & Wistow, 1994; Bombard et al., 2018). Moreover, the findings in Paper 3 advance our understanding of what an adequate preventive service should look like, gathering knowledge that can be beneficial not

only for children of anxious parents, but also for children whose parents have other mental illnesses.

## **5.3 Limitations and Implications**

### **5.3.1 Limitations of the Studies Included in this Thesis and Avenues for Future Research**

The three papers presented in Chapters 2 to 4 overall aimed to advance the promotion of mental health among children of anxious parents, addressing some knowledge gaps in the literature, especially regarding the risk posed by fathers' anxiety and the support needs of anxious parents. The limitations of each of the three papers have been discussed in Chapters 2-4. Here, I will take a broader approach and highlight areas that warrant further investigation.

Firstly, in the last decades we have witnessed a gradual update of traditional family roles, with a growing centrality of parenting in men's lives (Cabrera & Tamis-LeMonda, 2013; Feldman, 2023). Fatherhood is considered one of the most rapidly changing roles in the history of the human family (Feldman, 2023), and the studies presented in Paper 1 and Paper 2 may not accurately reflect the contemporary landscape of fatherhood. The most recent database search for the meta-analyses presented in Paper 1 was conducted in February 2022, and the included studies were published between 1963 and 2022 (although the great majority were published in the last decade). Additionally, the data on fathers analysed in Paper 2 were collected in the 1990s, thus potentially reflecting different societal and cultural views of fatherhood than the current expectations. Hence, to adequately capture the changing involvement of fathers in the family context and their influence on their children's development, it is key to involve fathers in the research focused on treatment and prevention of child mental ill-health and examine their contribution in the intergenerational transmission of risk. Further, the discussion on fathers' contribution to child mental health must be framed within theoretical accounts updated in light of the transforming role of fathers and the novel empirical evidence.

A second limitation has to do with the generalisability of the findings. Although efforts were made to include diverse ethnic/racial groups (e.g., for the meta-analysis presented in Paper 1, the grey literature was also searched and no language limits were applied to the search strategy; for the qualitative study presented in Paper 3, interviews were conducted online to limit geographical barriers and purposive sampling was used to recruit parents from different backgrounds and locations across England), the samples in all three papers are most representative of White ethnic groups, and this should be taken into account when interpreting the results. This aspect underlies a more general issue in family mental health research, that presently sees an underrepresentation of many racial and ethnic groups. Especially considering how cultural and sociodemographic characteristics can influence child development, posing unique challenges and distinct risk and protective factors (e.g., Grüning Parache et al., 2024; Shaffer, 1996; Siddiqi et al., 2012), it is of utmost importance that efforts are made to include more culturally, ethnically, and socioeconomically diverse samples, and that future studies target currently underrepresented groups (e.g., low-income groups and Non-Western cultures). In this way, findings will more accurately reflect the experiences and needs of all families, ultimately enhancing the relevance and applicability of research (Helmerhorst, Majdandžić, & Cabrera, 2023).

A third limitation is that the studies presented in Paper 1 and Paper 2 do not allow to draw strong causal conclusions regarding the impact of paternal anxiety on offspring emotional and behavioural problems, and more research is needed to shed light on the father-specific contribution to child development. Future studies should use experimental designs or quasi-experimental designs to test the causal role of paternal anxiety symptoms and disorders in the intergenerational transmission of mental illness, as well as identify the causal mechanisms underlying the associations between paternal anxiety and child mental health outcomes. This is especially key to inform the development of effective prevention programmes. Indeed, while Paper 3 explored the characteristics of an acceptable and accessible preventive service to help anxious parents support their children, more research is needed to identify what the focus of

the programme should be. It is then paramount to engage (potential) service users in the design of the programme, for example via PPI, to ensure that their needs are effectively met (Barnes & Wistow, 1994; Bombard et al., 2018).

Some existing studies point to potential intervention targets. For example, in a randomised controlled trial investigating the efficacy of a family-based intervention to prevent the onset of anxiety disorders in children aged 6 to 13 with anxious parents, Ginsburg et al. (2015) identified parental modelling of anxiety and parental distress as significant mediators. These results identify potential mechanisms of risk transmission which an intervention can target and suggest that reducing anxious modelling and lowering parents' overall distress levels (rather than focusing solely on anxiety) may be critical for decreasing child anxiety symptoms. Moreover, maternal modelling of anxious behaviours was shown to have a causal role on infants' anxious responses (i.e., fearfulness and avoidance) towards a stranger in an experiment conducted by de Rosnay et al. (2006) with non-anxious mothers and their 12-to-14 month-old babies. In other research, controlling parenting was indicated as a risk factor in the development of childhood anxiety: in their experimental study, Thirlwall and Creswell (2010) trained a non-clinical sample of mothers to engage in controlling and autonomy-granting behaviours while interacting with their 4 to 5 years old children and found that controlling parenting behaviours led children to make more negative predictions about their performance in a mildly stressful task and to feel less happy about the task, compared to when mothers engaged in autonomy-granting behaviours. However, research on the causal mechanisms of risk transmission from *fathers' anxiety* to their *preschool-age* children's outcomes, including *emotional and behavioural* difficulties, is lacking.

Importantly, more research is needed to better understand the independent and combined effects of fathers and mothers on their children's mental health and the long-term impact of parental mental ill-health on children. In a prospective study of the ALSPAC cohort investigating the associations between paternal depression during the postnatal period (8 weeks after birth) and offspring depression symptoms at 18 years, Gutierrez-Galve et al. (2019)

found that the increased risk seen for female offspring was partially explained by maternal depression symptoms 8 months after birth. In addition, in a previous study by the same research team, it was found that also couple conflict mediated the association between postnatal depression symptoms in fathers and child emotional and behavioural difficulties at 42 months after birth (Gutierrez-Galve, Stein, Hanington, Heron, & Ramchandani, 2015). Hence, it is important that future studies explore potential environmental pathways that may explain the associations found between paternal anxiety and offspring mental health difficulties, testing potential mediators such as maternal mental health (including maternal anxiety), couple conflict, and specific parenting behaviours (e.g., modelling of anxious behaviours, overcontrol). Further, Paper 2 considered offspring outcomes at 42 and 91 months, but the examination of the long-term impact of paternal anxiety on their offspring via longitudinal studies with longer follow-ups and testing the offspring mental health trajectories is also warranted.

It is important to recognise that family members and relationships are interdependent, and that a full understanding of fatherhood and of the influence of fathers on their children cannot be achieved if fathers are examined in isolation (Wang, Donithen, & Schoppe-Sullivan, 2022). In Paper 1, it was not possible to account for the role of maternal mental health, while in Paper 2, analyses were adjusted for maternal anxiety and depression pre- and postnatally and maternal history of mental illness. While the findings in Paper 2 indicate that fathers' anxiety represents a risk factor for offspring mental health independently from maternal mental health (and from other key variables, such as sociodemographic variables, child temperament, paternal depression and history of mental illness), I did not directly compare the impact of maternal and paternal anxiety on their offspring, I did not test bidirectional father-child relationship effects, and I did not consider family members' mutual influences on one another (e.g., whether and how the mother-father relationships influenced fathers' parenting beliefs and behaviours; Wang et al., 2022). Future studies should consider these elements and take a family systems perspective (Cox & Paley, 1997; Kreppner & Lerner, 2013; Minuchin, 1985), examining fathers within the context of their key relationships and interactions with other family members,

and recognising that children develop in a network of close relationships with significant caregivers, which goes beyond studying individual dyadic relationships. Furthermore, in my studies I assumed heteronormative families, and it is important that future research i) assesses and differentiates between sex and gender of parents and offspring, and ii) investigates the intergenerational transmission of psychopathology in non-traditional families, such as gay, lesbian, blended and step families (Helmerhorst et al., 2023).

To conclude, increasing the involvement of fathers in research focused on developmental psychopathology and incorporating assessments of fathers' mental health into research datasets will help address clinically relevant questions related to the aetiology and treatment of youth mental ill-health. For example, this can inform whether one parent can compensate for the other, clarify whether having both parents with anxiety has additive effects on children, and guide strategies for helping parents support each other and their children in clinical interventions (Strawn & Peris, 2024).

### **5.3.2 Clinical Implications**

The three studies presented in this thesis have some important implications for clinical practice.

Paper 1 and 2 demonstrated that anxiety in fathers, including during the perinatal period, can negatively impact children's emotional and behavioural outcomes. This points to the need of recognising and treating anxiety symptoms and disorders (also) in fathers, not only to improve their own quality of life, but also to implement successful preventive interventions or treatments for child mental health. Paternal anxiety, and mental health in general, should be assessed and addressed early on, for example in perinatal services, to help ensure a positive development for children, and should be considered when a child exhibits emotional or behavioural difficulties.

While further research is needed to clarify the mechanisms underlying the intergenerational transmission of psychopathology, the studies presented in this thesis underscore the potential value of involving fathers as active agents of change in clinical

interventions aimed at addressing (or preventing) CYP mental ill-health. This calls for better family-centered approaches to prevention and treatment that extend beyond the mother-child dyad (Peris, Thamrin, & Rozenman, 2021; Strawn & Peris, 2024).

Moreover, the transition to parenthood is a crucial time for parents, and prevention and intervention programs aimed at assisting new (particularly if at-risk in light of mental illness) fathers in the transition to parenthood and at increasing fathers' positive engagement with the child and the family may be beneficial (Wang et al., 2022). Relatedly, the significant contribution of fathers for child development adds value to parental leave policies for fathers, as they have the potential to help promote higher paternal involvement with children.

Paper 3 provided key information regarding what parents who have experienced anxiety would need to support their children's positive development, with findings that can have direct application in clinical settings. Firstly, the study highlighted the importance of educating parents about the transmission of mental health difficulties across generations and the early signs of poor mental health to watch for in their children. Secondly, it offered useful insights into the characteristics of an acceptable and accessible service aimed at promoting the mental health of children with anxious parents. Crucially, this knowledge can be relevant beyond the context of parental anxiety and could inform and guide the development and implementation of preventive services across multiple clinical and non-clinical domains.

## 5.4 Conclusions

The empirical work presented in this thesis contributes to the promotion of mental health in children with anxious parents in several ways. The comprehensive systematic review and meta-analysis presented in Paper 1 shows that paternal anxiety is significantly correlated with offspring emotional and behavioural difficulties with small to moderate effect sizes. The significant contribution of paternal anxiety to child mental health is further confirmed in the longitudinal study presented in Paper 2, which demonstrates that paternal anxiety in the perinatal period confers risk for subsequent emotional and behavioural problems and probable

psychiatric diagnoses in children, even when controlling for maternal mental health, child temperament, and sociodemographic variables. Finally, Paper 3 gives space to the voices of parents who have experienced an anxiety disorder, focusing on their needs regarding the promotion of their young children's mental health. It outlines potential barriers and facilitators to accessing support and provides insights into what an accessible and acceptable preventive service might look like. Taken together, these results overcome several limitations from previous literature, address key knowledge gaps, generate new avenues for future research, and highlight the importance of involving both mothers and fathers in the promotion of child mental health.

# **Appendix A    The Impact of Maternal vs Paternal Anxiety on Their Offspring: A Database Search**

## **Web of Science Core Collection**

Search conducted on 23.09.2024

1: (TI=(father\* or patern\*)) OR AB=(father\* or patern\*), Results: 140312

2: (TI=(anxiety or anxious)) OR AB=(anxiety or anxious), Results: 369609

3: (TI=(transmission or intergeneration\* or "inter-generation\*" or associat\* or effect\* or role\* or impact\* or relation\*)) OR AB=(transmission or intergeneration\* or "inter-generation\*" or associat\* or effect\* or role\* or impact\* or relation\*), Results: 31404075

4: (TI=(Child\* or offspring\* or infan\* or adolescen\* or teen\* or toddler\* or bab\* or "young person\*" or "young adult\*")) OR AB=(Child\* or offspring\* or infan\* or adolescen\* or teen\* or toddler\* or bab\* or "young person\*" or "young adult\*"), Results: 3069666

5: (TI=(mother\* or matern\*)) OR AB=( mother\* or matern\*), Results: 635095

6: #1 AND #2 AND #3 AND #4, Results: **2,577**

<https://www.webofscience.com/wos/woscc/summary/27df9a3f-8d2e-460b-97fe-c6174a0d249a-010adf756e/relevance/1>

7: #5 AND #2 AND #3 AND #4, Results: **10,968**

<https://www.webofscience.com/wos/woscc/summary/27df9a3f-8d2e-460b-97fe-c6174a0d249a-010adf756e/relevance/1>

# **Appendix B    Infant Learning from Fathers in a Social Referencing Paradigm: A Stage 1 Registered Report**

## **Notes**

This manuscript has received in-principle approval from the *Journal of Developmental Psychology* as a Stage 1 Registered Report:

Zecchinato, F., Kreppner, J., Aktar, E., & Lawrence, P. J. (2023). Infant learning from fathers in a social referencing paradigm: a registered report. *Developmental Psychology*.

## **CRedit (Contributor Roles Taxonomy)**

Francesca Zecchinato: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Visualization, Writing – original draft, Writing – review and editing

Jana Kreppner: Conceptualization, Methodology, Project administration, Supervision, Writing – review & editing

Evin Aktar: Methodology, Writing – review & editing

Peter J. Lawrence: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing

### **Abstract**

Anxiety disorders are among the most prevalent mental disorders among children worldwide. The exposure to parents' anxious behaviours represents an environmental risk factor for offspring anxiety, and infant behavioural inhibition is prospectively associated with the broad class of anxiety disorders. However, fathers have been largely neglected in the study of child anxiety and their causal role in its intergenerational transmission remains to be investigated. In this experiment, we will test the impact of experimentally-manipulating fathers' socially anxious behaviours on their infants' behavioural and emotional responses to a stranger in a social referencing paradigm. Moreover, we will investigate the moderating role of infant behavioural inhibition. Twelve to 14-month-old infants (N sample size = XX; M age = XX; SD = XX) recruited in the county of Hampshire, United Kingdom, will participate in the study with their non-anxious fathers, who will be trained to interact in a neutral or anxious manner with two different male strangers. All infants will experience two conditions: (i) father interacting in a neutral (i.e., non-anxious) manner with the stranger, and (ii) father interacting in a socially anxious manner with a different stranger. The order of each condition and the order of stranger presentation will be counterbalanced. This experimental study will help shed light on the causal role of fathers' anxious behaviours in the intergenerational transmission of anxiety.

**Keywords:** anxiety, behavioural inhibition, fathers, infants, social referencing paradigm.

## Introduction

Anxiety Disorders (ADs) are the most common group of mental health disorders in children, with a worldwide prevalence of approximately 6.5% (Polanczyk, Salum, Sugaya, Caye, & Rohde, 2015), and represent the sixth leading cause of disability globally (Baxter et al., 2014). As demonstrated by a recent meta-analysis, the earliest peak onset for anxiety and fear-related disorders is at five and a half years, while the median age at onset is 17 years (Solmi et al., 2022). Indeed, it is estimated that ADs have already emerged before age 14 in more than 38% of individuals (Solmi et al., 2022). Further, ADs have long-lasting negative impacts on daily functioning and multiple life domains, including educational under-attainment, peer victimization, and later physical and mental health disorders (Cabral & Patel, 2020; Lawrence, 2018). For these reasons, ADs represent a serious burden for both individuals and societies and are considered a major health priority (Yang et al., 2021). Hence, their prevention is desirable, and the detection of modifiable risk factors is crucial for the identification of possible targets in prevention, that can then inform effective prevention strategies.

ADs aggregate in families. Indeed, ADs in parents, compared to their absence, are associated with a significantly increased prevalence of offspring ADs (Lawrence et al., 2019a; Micco et al., 2009), making parental AD an important risk factor for child ADs. However, the mechanisms underlying these familiar associations remain unclear. Theoretical frameworks of anxiety development in children highlight two main pathways of parent-to-child anxiety transmission (Fisak & Grills-Taquechel, 2007; Murray et al., 2009), namely the inheritance of genetic risk factors and the exposure to environmental stressors. The heritability of ADs is estimated in the range of 20 to 60% (Craske et al., 2017; Polderman et al., 2015); however, candidate gene studies of ADs have not found robust gene-disorder associations (Smoller, 2016) and research suggests that a multitude of common genetic variants with modest effects and shared with other internalising disorders accounts for the risk for ADs (Purves et al., 2020; Smoller, 2016). Further, studies genetically informed to examine the intergenerational transmission of risk (e.g., Ahmadzadeh et al., 2019; Eley et al., 2015) have demonstrated that

the association between parental and offspring anxiety is not significantly confounded by genetic relatedness. Hence, it is likely that a combination of genetic vulnerability and environmental stressors contribute to the aetiology of ADs in offspring (Purves et al., 2020; Smoller, 2016), with a significant body of evidence supporting the key role of environmental influences in the intergenerational transmission of anxiety (Eley et al., 2015; Murray et al., 2009).

Particular parenting practices that increase children's sense of threat or limit their opportunities to tackle challenges, and thus develop a sense of mastery over the environment, are proposed to contribute to the development of child ADs and have been found to be particularly common in parents with ADs (Murray et al., 2009). Evidence from meta-analyses indicates that parental behaviours, at a broad level, play a small and significant role in the development of child anxiety (McLeod et al., 2007; Möller et al., 2016). Furthermore, these meta-analyses make the case for the importance of conceptual specificity, which can be obtained by disaggregating parenting dimensions into more specific components (McLeod et al., 2007) and by distinguishing between particular types of parenting behaviours, for example overcontrol and overprotection (Möller et al., 2016). Indeed, examining specific parenting practices, such as expressed anxious behaviours rather than overcontrol, in specific contexts, such as with or without a social stressor, can clarify their contribution (e.g., Lawrence, Creswell, Cooper, & Murray, 2020a; Murray et al., 2012), which may be lost when parenting practices are examined at a broader conceptual level (McLeod et al., 2007; Möller et al., 2016).

Specifically, theoretical accounts suggest that parents may environmentally transmit anxiety to their children via a social learning pathway (Bandura & Walters, 1977; Olsson & Phelps, 2007), that is by the modelling of anxious behaviours or by the verbal communication of threat-relevant information, in social situations (Askew & Field, 2008; Bandura & Walters, 1977; Fisak & Grills-Tauechel, 2007; Murray et al., 2009). Observational and experimental studies support the importance of modelling in the intergenerational transmission of parental anxiety to toddlers and infants. For example, in their longitudinal study, Murray et al. (2008) found that, compared to a control group of mothers without ADs, mothers with social anxiety disorder (SAD)

expressed more anxiety (via facial, bodily and verbal cues, such as worried or fearful expressions, tense posture, wringing hands, and rushed or agitated speech) in a social referencing (SR) paradigm, where they engaged in a conversation with a female stranger while their 10-month-old infant observed the interaction and the infant's response to the stranger was assessed. More importantly, the expressed signs of anxiety in mothers with SAD predicted increased infant social avoidant behaviours four months later, in particular during the more stressful moments of the interaction between the infant and the stranger (i.e., when the stranger picked the infant up; Murray et al., 2008). With a similar SR task, Aktar et al. (2013) reported that, at 12-months, parents' expressed anxiety, but not parental lifetime anxiety disorders, predicted infant avoidance during interactions with social (i.e., a stranger) and non-social (i.e., a mechanical dinosaur) novel stimuli, complementing previous studies and indicating that, at 12 months, parental expressions of anxiety in the moment via bodily, facial and verbal cues have a greater impact than their lifetime anxiety diagnoses in the social learning of fear. Adopting an experimental design, Gerull and Rapee (2002) showed that, compared to positive facial expressions, the manifestation of disgust and fear by non-anxious mothers in the presence of a novel object resulted in stronger avoidance behaviour or fearfulness on behalf of their toddlers, providing evidence of a potential causal influence of expressed anxious parenting behaviours on offspring anxious reactions.

Another crucial gap in our knowledge concerns the specific impact of fathers in the intergenerational transmission of psychopathology, especially in light of the evidence that fathers and mothers are likely to influence their children's symptomatology in different ways (Bögels & Phares, 2008; Natsuaki et al., 2014; Ramchandani & Psychogiou, 2009). With specific regard to ADs, evolutionary theories of parenting assign fathers an important role in the development of social anxiety due to their pre-agrarian role in the dealing with the social world beyond the extended family or clan, and in encouraging their children's autonomy (Bögels & Phares, 2008; Bögels & Perotti, 2011). Arguably, cultural factors are likely to influence the way parents behave across cultures, societies, and historical eras (Paquette, 2004), thus making

parental roles subject to differences and transformations, and potentially limiting the utility of evolutionary frameworks. Notably, Aktar et al. (2013) found no significant difference between mothers and fathers in the strength of the associations between expressed parental anxiety and infant avoidance, pointing to an equally important role of fathers and mothers in the intergenerational transmission of anxiety in infancy (Aktar et al., 2013). This is a particularly relevant finding considering that, historically, fathers have been largely neglected in the study of child anxiety and, more generally, in the field of developmental psychopathology (Bögels & Phares, 2008). This tendency may have been motivated by practical assumptions, such as that mothers are easier to involve or more willing to take part in research compared to fathers (e.g., Phares & Compas, 1992), as well as more general assumptions, including that mothers spend the majority of time with their infants and thus have a greater impact on their development, and that, overall, mothers matter more than fathers (Bögels & Phares, 2008; Lamb, 2000). However, these assumptions lack empirical support. Indeed, research shows that the engagement in studies is more related to factors such as the amount of involvement required rather than parent gender (Phares & Compas, 1992), and that quality, rather than quantity, of parental involvement has greater influence on child development and wellbeing (Amato & Rezac, 1994; McBride et al., 2002). Moreover, although their roles change over time and may vary significantly between different societies and cultures, fathers have an active presence in childcare in most countries and cultures, and seem to have a stronger influence on their children's development than what was assumed in the past (Ramchandani & Psychogiou, 2009); hence, a thorough examination of fathers' influences in the context of ADs transmission is warranted.

Child temperamental dispositions are also important in relation to the development of ADs. Behavioural inhibition (BI), which is often referred to as negative reactivity to novelty, social reticence or fearful temperament in early infancy (Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Kagan & Snidman, 1991), refers to the biologically driven temperamental characteristics of fear, avoidance, and withdrawal in novel situations or with unfamiliar people and/or objects (Kagan, Reznick, & Snidman, 1987). BI in infancy and early childhood is prospectively associated

with the broad class of ADs (Degnan & Fox, 2007), almost tripling the odds of developing subsequent anxiety disorders (Sandstrom et al., 2020). BI represents a particularly strong risk for later SAD (Clauss & Blackford, 2012; Sandstrom et al., 2020) and has been shown to account for approximately 10.4% of the total variance in its development in the second year of life (Paulus, Backes, Sander, Weber, & von Gontard, 2015). This might be explained by a combination of genetic factors, similarities in core features of BI and SAD, as well as the measures used to assess BI (Sandstrom et al., 2020).

The exposure to parental expressed anxiety may interact with infant BI, making high BI infants particularly susceptible to that environmental stressor. This hypothesis is in line with the diathesis-stress (Zuckerman & Riskind, 2000) and vulnerability-stress (Ingram & Luxton, 2005; Nigg, 2006) models, according to which genetic vulnerability and environmental factors, independently and in combination, increase the liability to a disorder. Evidence from the literature on the intergenerational transmission of anxiety in infancy using SR paradigms supports the interplay between parental anxiety and BI on child fearful and avoidant reactions. In studies from the UK in mothers with ADs (Murray et al., 2008), and the Netherlands in parents (both mothers and fathers; Aktar et al., 2013), SR paradigms were adopted to examine differences between infants of anxious parents and non-anxious parents. Murray et al. (2008) found that, following a SR task at 10 months, the association between maternal SAD and infant avoidance of an adult stranger was moderated by infant BI. Specifically, for behaviourally inhibited infants, compared to non-behaviourally inhibited infants, the increase in avoidance was greater and extended to the less stressful episodes of the infant-stranger interaction (e.g., during the graded approach of the stranger). Aktar et al. (2013), using a very similar SR task with 10-month infants, reported a positive association between expressed parental anxiety and infant avoidance *only* among infants with moderate-to-high BI.

Crucially, the end of the first year of life is a particularly sensitive period for the exposure to environmental adversity (Goodman & Gotlib, 1999; Leppänen, 2011) and for the social learning of anxiety because of the emergence of SR skills. SR is the process infants typically

begin to use between 7 and 10-months of age of seeking information about unfamiliar objects, people or situations from a social interaction partner (such as a parent), in order to inform their own emotions and behaviours towards that unfamiliar object, person or situation (Carpenter, Nagell, Tomasello, Butterworth, & Moore, 1998; Feinman, 1982; Feinman, Roberts, Hsieh, Sawyer, & Swanson, 1992). It is argued that SR processes may be especially relevant to the study of SAD, as the development of SR skills also coincides with the onset of the wariness of strangers (Sroufe, 1977).

Taking into account the state of the art, the need emerges to test experimentally the causal role of fathers' expressions of anxiety in infants' subsequent anxious behaviour and affect. It is important to acknowledge that studies employing longitudinal semi-experimental designs with clinically anxious parents do not allow for inferences to be drawn regarding causal relationships between parental expressions of anxiety and observed infant anxious responses. Indeed, infants of clinically anxious parents have a learning history of observing anxiety in their parents' day-to-day behaviours, thus it is not possible to disentangle the effect of infants' observations of parents' anxious behaviours in a laboratory setting from the influence of their parents' day-to-day anxious parenting (e.g., verbal information transfer, overcontrol, overprotection; see Möller et al., 2016; Murray et al., 2009). On the contrary, in their experimental study, de Rosnay et al. (2006) tested the causal effects of anxiety expressions towards male strangers in *non*-anxious mothers' behaviours, which were experimentally manipulated to be either socially anxious or neutral, on their 12-to-14 month-old infants responses to the same strangers. The results showed that when those infants, who had no anxious learning history, observed their mothers act anxiously with the stranger, they showed more anxious behaviours (i.e., were more fearful and avoidant) in their own interactions with the same stranger, compared to when the infants observed their mothers engaging in a neutral interaction with the stranger. Moreover, in line with the earlier literature, this effect was moderated by infant temperament. That is, the anxiogenic effect of parental anxious behaviours was greater for infants classified as high in BI than for those classified as low in BI (de Rosnay et

al., 2006). This study provides a demonstration of a causal role for maternal anxious behaviours on infants' anxious responses in a SR paradigm, moderated by infant temperamental inhibition. However, it remains unknown whether infants *without* a learning history of observing anxiety in their *fathers* respond anxiously after observing their (non-anxious) fathers react anxiously to an adult stranger in a SR paradigm.

Given the particularly early onset of ADs and the need to better understand the role of fathers in the parent-to-offspring anxiety transmission, building on the evidence highlighting the end of infancy as a sensitive period for the exposure to parental anxious behaviours, the present experimental study targets father-infant dyads with the aim to advance our knowledge of the social learning of anxiety from fathers and of the moderating influence of infant BI. Specifically, we will address the following research questions: 1) do fathers' behaviours (anxious vs neutral) while interacting with an adult stranger influence their infants' emotional and/or behavioural responses (as happens with mothers), and 2) is the association between paternal anxious behaviours and infant anxious responses moderated by infant BI?

Building on the social learning accounts for the development of ADs in infancy (Bandura & Walters, 1977; Murray et al., 2009; Olsson & Phelps, 2007) and on the interplay between temperamental susceptibility and environmental stressors supported by the diathesis-stress (Zuckerman & Riskind, 2000) and vulnerability-stress (Ingram & Luxton, 2005; Nigg, 2006) models, and in line with previous SR literature examining the intergenerational transmission of anxiety (e.g., Aktar et al., 2013; de Rosnay et al., 2006; Murray et al., 2008), we hypothesise that:

- 1) Infants' reactions to a stranger will differ between the two conditions of observation of their fathers' behaviour towards the stranger. Specifically, we predict that infants will display more fearful and avoidant behaviours towards a stranger whom they have observed their father interact with in a socially anxious manner (i.e., anxious condition), compared to when they have observed their father interact with a stranger in a neutral (non-anxious) manner (i.e., neutral condition);

- 2) the association between paternal behaviour and infant fear and avoidant behaviours will be moderated by infant BI. Specifically, infants high in BI will display significantly more anxious behaviours in the anxious condition compared to infants non-high in BI.

## **Materials and Methods**

### **Design**

To draw a firm conclusion about the impact of non-anxious fathers' socially anxious behaviours on their infants' behavioural and emotional responses (i.e., fearfulness and avoidance), we will conduct a within-subjects laboratory-based experiment with father-infant dyads using a SR paradigm, assessing the role of paternal behaviours (neutral vs anxious) and infant BI (high vs non-high) in infant responses while interacting with a male stranger. All infants will experience two conditions: father interacting in a neutral (i.e., non-anxious) manner with a male stranger, and father interacting in a socially anxious manner with a different male stranger. To minimise the impact of order effect, we will counterbalance the order of each condition, as well as the order of stranger presentation, hence resulting in four combinations. Equal numbers of boys and girls will experience each combination.

### **Participants**

Opportunity sampling will be used to recruit father-infant dyads for our study. de Rosnay et al. (2006) reported a medium effect size of  $d = .58$  for the main effect of condition (anxious vs neutral) on infant fearful behaviours. For interactions, they reported a large effect of  $d = 1.35$  for anxious condition with BI (high vs low), and a very large effect of  $d = 2.48$  for the interaction of condition (neutral vs anxious) with high BI on infant avoidance behaviours. We took a more conservative approach and based our analyses on smaller effect sizes. We used G\*Power software (Faul, Erdfelder, Lang, & Buchner, 2007) to calculate an a priori sample size, with *alpha* set to .05. The analyses showed that 70 father-infant dyads would be sufficient to detect a small to medium effect size (Cohen's  $f = 0.2$ ) in our primary hypothesis (i.e., effect of anxious vs neutral condition on infant reactions) at 90% power. This sample size also gives us 80% power

to detect a small to medium effect size (Cohen's  $f = 0.17$ ) in our Hypothesis 2 (i.e., interaction between condition and infant BI). To be eligible for inclusion in the SR task, fathers will be required to be 18 years old or above, fluent in English, with no learning disability, no current anxiety diagnosis and no clinically relevant anxiety symptoms in the past 12 - 14 months (i.e., since the baby was born). We will assess that participants score below clinical cut-offs for anxiety via screening questionnaires completed prior to the SR task itself. Moreover, they will be fathers of a typically developing infant (i.e., birth weight over 2500g without any congenital health difficulties) aged between 12 and 14 months. Participants will be recruited in the Southampton area, United Kingdom, through advertisements across the University of Southampton, local parent-baby groups, local nurseries, and via social media (e.g., Twitter). Overall, XXX fathers completed the online screening questionnaires ( $M_{age} =$ ,  $SD =$ ). XXX were excluded because XXX. Our final sample comprised XX boys and XX girls, between 12 and 14 months of age ( $M_{age} =$ ;  $SD =$ ), and their fathers ( $M_{age} =$ ;  $SD =$ ). All participants will provide informed consent prior to every session (i.e., online and in-person) of the study. Ethical approval has been granted from the University of Southampton Research Governance and Ethics Committee (reference number: 53935).

## **Material**

### ***Screening Measures***

Fathers interested in taking part in the study will complete a range of demographic questions (i.e., age, ethnicity, education, employment status, household income, religion, sexual orientation, marital status, partner's anxiety, and household type) and questionnaires via Qualtrics to assess their eligibility to participate. Specifically, the 16-item Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), the 20-item Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998), and the 7-item Generalized Anxiety Disorders Scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) will be used to screen for anxiety symptoms. The cut-offs to identify anxiety symptoms (hence leading to exclusion from the study) will be a score  $\geq 64$  for the PSWQ (Meyer et al., 1990),  $\geq 36$  for the SIAS (Peters, 2000), and  $\geq 8$  for the

GAD-7 (Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007). Hence, only fathers who score lower than these cut-offs on *all* these measures will be eligible to participate. The internal reliability of these measures was poor/adequate/excellent in our study (PSWQ *Cronbach's a* = XX; SIAS *Cronbach's a* = XX; GAD-7 *Cronbach's a* = XX).

Depressed parents, compared to non-depressed parents, tend to display more flat affect and more negative facial expressions (e.g., Field, 1992; Striano, Brennan, & Vanman, 2002); further, parental depression may exert an impact on infant behavioural and emotional responses (e.g., Sweeney & MacBeth, 2016); hence, we will assess depressive symptoms and adjust for their effect using them as a covariate. Fathers will complete the 10-item Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987). Given the sensitive nature of its question about the thought of self-harm, the EPDS will be administered to fathers when visiting the University, with members of the research team on hand to assess and manage risk, prior to completing the SR tasks with their infant. Participants will not be excluded on the basis of the EPDS scores; however, any participants who will endorse the risk item on the EPDS (i.e., they indicate that they have recently experienced thoughts of harming themselves) will be offered support to contact their general practitioner (GP/family doctor). In the current study, the internal reliability of this questionnaire was poor/adequate/excellent (*Cronbach's a* = XX).

**Infant BI.** At the screening phase, fathers will complete the fear subscale of the Infant Behavior Questionnaire – Revised (IBQ-R; Gartstein & Rothbart, 2003), which will be used to measure infant BI. The IBQ-R is a 191-item parent-report measure that assesses 14 domains of infant temperament, namely approach, vocal reactivity, high intensity pleasure, smiling and laughter, activity level, perceptual sensitivity, sadness, distress to limitations, fear, falling reactivity, low intensity pleasure, cuddliness, duration of orienting, and soothability using a 7-point Likert scale (1 – *never* to 7 – *always*, with a *does not apply* option if the event did not occur within the time span of interest). For the purpose of our study, and building on de Rosnay et al. (2006), we will only focus on the fear domain, which refers to a child's startle to sudden changes in stimulation, inhibited approach to novelty and distress in the presence of novel physical

objects or social stimuli (Gartstein & Rothbart, 2003) and has a theoretical overlap with the construct of BI (Gagne, Vendlinski, & Goldsmith, 2009). Previous research found moderate significant convergence between parent-reported and laboratory-observed infant temperamental fear, as well as between father and mother reports (e.g., Braungart-Rieker, Hill-Soderlund, & Karrass, 2010; Gagne, Van Hulle, Aksan, Essex, & Goldsmith, 2011; Gartstein & Marmion, 2008; Gartstein & Rothbart, 2003; Planalp, Van Hulle, Gagne, & Goldsmith, 2017; Rothbart, 1981).

We will screen for BI to create a balanced sample of highly behaviourally inhibited and non-highly behaviourally inhibited infants. Specifically, based on the scores in the IBQ-R-fear obtained by 12 to 14 month-old infants worldwide (S. Putnam, personal communication, September 27, 2022), those who score on the 80<sup>th</sup> percentile or above (i.e.,  $\geq 3.5$ ) in the IBQ-R-fear will be classified as high BI, those who score below the 80<sup>th</sup> percentile (i.e.,  $< 3.5$ ) will fall within the non-high BI group. Scores in the IBQ-R-fear ranged from XX to XX ( $M = XX$ ,  $SD = XX$ ). The mean score for the non-high BI group was XX ( $SD = XX$ ), and the mean score for the high BI group was XX ( $SD = XX$ ). For our sample, the internal reliability for the IBQ-R-fear was poor/adequate/excellent (*Cronbach's  $\alpha$*  = XX).

### ***Paternal Training Material***

Two short videos (for details see B.1) were recorded of a man role-playing both a neutral (i.e., non-anxious) and a socially anxious interaction with a male stranger, in line with the DSM-5 clinical descriptions of SAD and observations of social anxiety in a SR paradigm (Murray et al., 2008). These included bodily behaviours, such as tense posture, wringing hands, and poor eye contact (i.e., frequent looks towards hands/floor during the social interaction, attention drifted around the room without a focal point), and facial expressions of anxiety, such as lip-biting, grimaces, facial twitches or rapid blinking, worried or sad expressions. Conversational dimensions included nervous laughter and limited responses to questions. Based on de Rosnay et al. (2006), the behaviours in the neutral video were relaxed posture, good eye contact (i.e., attention either directed mainly at the stranger or smoothly shifted between the stranger and

the infant), and a friendly expression that suggests openness (e.g., appropriate back-channelling cues such as nodding and small agreement smiles). The quality of speech was characterised by complete answers to questions and a conversational tone that encouraged further dialogue.

In line with previous studies (de Rosnay et al., 2006; Murray et al., 2008), as a manipulation check to assess the effectiveness of paternal training, a research assistant, blind to the study hypotheses and to the condition displayed in the video, will rate paternal anxiety during the father-stranger interaction on a 5-point Likert scale (1 – *no anxiety* to 5 – *pervasive social anxiety*) using the coding protocol for the stranger SR task by Murray et al. (2008). To assess the inter-rater reliability and alleviate the threat of restricted range, a second coder will rate 20% of the father-stranger interaction clips. Percentage agreement and interclass correlation coefficients (ICCs) were as follows: % and XX. Adopting the criteria proposed by Jacobson and Truax (1992) to test for a reliable change between conditions, and depending upon the means and standard deviations in our sample, for the neutral scenario, we will exclude any fathers whose expressed anxiety score is 2 SD above the mean calculated for the neutral condition; conversely, for the anxious scenario, we will exclude any fathers whose anxiety score is 2 SD below the mean calculated for the anxious condition. In the socially anxious condition, fathers' mean score was XX (SD = XX), while in the neutral condition the mean anxiety score was XX (SD = XX). A subsequent paired-samples *t*-test will reveal whether the difference is significant/non-significant.

### **Strangers**

Strangers will be two adult males of similar height and appearance and matched for ethnicity. In line with the methods adopted by de Rosnay et al. (2006), before the SR tasks, the strangers will be adequately trained in the procedure. Strangers will be taught to approach the infant gradually and converse in a neutral, reliable and consistent manner across conditions. Additionally, they will memorise a scripted set of questions to ensure a smooth and reliable conversation with the fathers.

## Procedure

To develop our experimental procedure and study design, we have consulted (via a virtual meeting) a group of fathers with relevant lived experience of anxiety, and we intend to maintain their involvement throughout the study process for dissemination purposes ("UK Standards for Public Involvement," 2019). Indeed, a growing body of evidence illustrates how Patient and Public Involvement (PPI) in mental health research can bring substantial benefits to research, improving the experience of participating in studies, making research more relevant and beneficial to the wider public, and impactful (Brett et al., 2014; INVOLVE, 2016).

The study will comprise an online screening session followed by an in-person experimental session at the School of Psychology, University of Southampton, and will be advertised across the University of Southampton, local parent-baby groups and nurseries, and via social media (e.g., Twitter) as a research study about 'How babies learn in social situations'.

Participants who, in principle, are interested in taking part, will be asked to complete the demographic questions and screening questionnaires (i.e., the PSWQ, SIAS, and GAD-7), as well as the IBQ-R-fear on Qualtrics. If they meet the eligibility criteria, participants will be able to arrange their visit at the University with their infant.

The university visit will have three phases. First, completion of the EPDS, second, father training and, third, the SR task. In the training phase, fathers will be informed about the overall experimental procedure. On each of two occasions, fathers will interact with a different male stranger, who will enter the laboratory and engage in conversation with them; on one occasion, fathers will be asked to behave as they would in an everyday interaction with a stranger (neutral condition); on the other occasion, fathers will be asked to pretend that they feel nervous and slightly fearful about interacting with the stranger (socially anxious condition). The two short training videos, depicting a man in each condition, will be used for illustration. Each video will be shown twice. The first time, the video will be viewed without sound and the focus will be on the behaviours displayed. The second time, emphasis will be given to more qualitative aspects of conversation. In both cases, the researcher will pause the footage and highlight relevant

features. Finally, fathers will be asked to rehearse the neutral and anxious responses along with the researcher. Fathers will be trained not to look at their infant during the two experimental conditions, while they will be asked to interact with their infant in a normal manner between conditions.

In line with the procedure adopted by de Rosnay et al. (2006), in the SR task phase, the father and infant dyad will sit 3.0 m apart, each located approximately 3.5 m away from the doorway. The infant will be strapped into a highchair, next to an empty chair for the stranger (positioned to the infant's left). Next to the father's chair, there will be a selection of magazines to read. After a brief period of acclimatisation, where the father will have the opportunity to ensure his infant is settled, the SR phase will begin. This phase will include two subsequent episodes and will last 3 minutes in total. In the first episode (father-stranger interaction), the stranger, after knocking, will enter the laboratory room, staying near the doorway. The stranger will greet the father and start a conversation lasting approximately 90s concerning general activities and experiences of the infant and the family. During this time, the stranger will sit facing the father, without attending to the infant. In the second episode (infant-stranger interaction), lasting approximately 60s, the stranger will first inform the father about his intention to talk to the infant and ask the father to read a magazine, disregarding the infant. Next, the stranger will greet and gradually approach the infant. The stranger will increase his engagement with the infant calling the infant's name, offering them a small toy and, finally, extending his arms in a position to pick the infant up. The stranger will then leave the laboratory. See Figure B1 for an overview of the study procedure.

Before the arrival of the second stranger for the second social interaction task, the father will have the opportunity to ensure his infant is settled. The second stranger will then enter the laboratory room and the two episodes will be repeated.

Fathers will be advised regarding which condition they should engage in first immediately before the SR task phase begins. Strangers will be blind to the condition at entry. The

experiment will be videorecorded using two wall-mounted cameras; one camera will record the overall picture, the other will provide a full-face image of the infant.

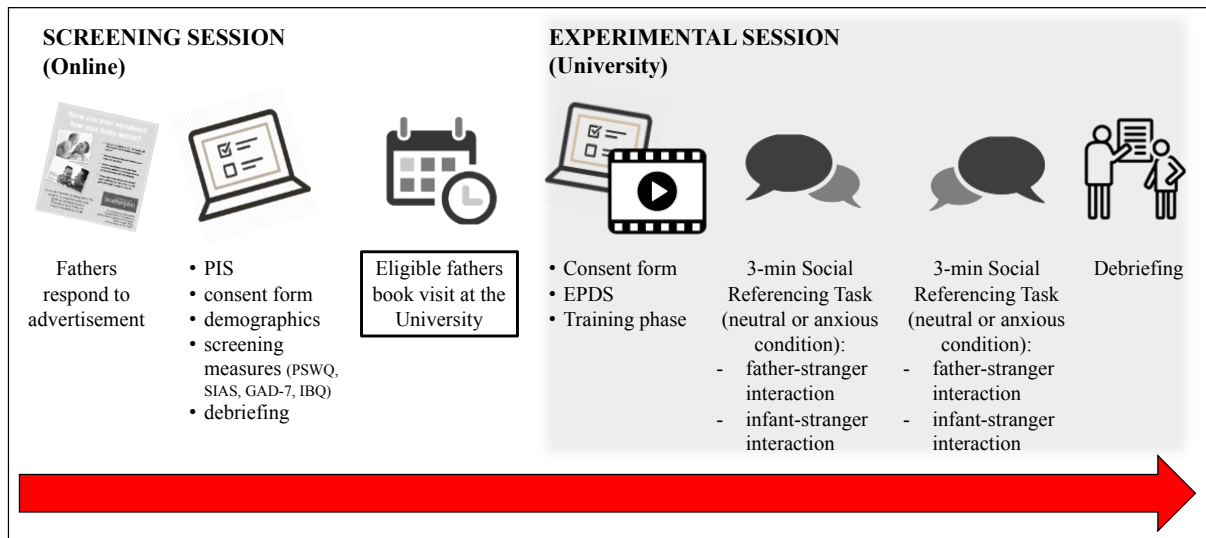


Figure B1 Overview of the Study Procedure

### ***Infant Behaviour During the SR Tasks***

In this study we aim to test whether infants model the observed paternal behaviours when they are confronted with a novel person in a social context. Hence, as a quality check, to ensure that the infant observes their father's behaviours in both experimental conditions, during the first minute of each father-stranger interaction, the number of times the infant looks in the direction of their father will be assessed. In the unlikely instance of no looks towards the father in one or both the experimental conditions, the dyad will be excluded from the study. During the infant-stranger interaction, we will assess two dimensions of infant affect, namely avoidance and fearfulness. Infant-stranger avoidance refers to infant attempts to avoid contact and interaction with the stranger, including behaviours such as turning their back on the stranger, increasing distance between self and the stranger, averting gaze or avoiding eye contact, and ignoring the stranger (Ainsworth, Blehar, Waters, & Wall, 1978). Infant-stranger fearfulness captures a range of behaviours defined as fearfulness and wariness (e.g., Schaffer, Greenwood, & Parry, 1972; Sroufe, 1977; Stevenson-Hinde & Shouldice, 1990) and includes fearful or wary expressions, sudden decrease in activity, tense or frozen postures, cry faces, fretting, fussing, whimpering, or crying.

### **Scoring**

The first author, blind to the experimental conditions, will score all footage of infants interacting with strangers. Footage showing only the infant will be scored and, to avoid any cues about which experimental condition the infant was experiencing, the infant-stranger interaction of both conditions will always be scored before the father-stranger interaction. The number of times the infant looks at their father's face during the father-stranger interaction will be counted.

Infant affect dimensions will be assessed during the stranger's gradual approach and interaction with the infant. For the purposes of scoring, and in line with the coding protocol by Murray et al. (2008), this episode will be divided into five phases lasting approximately 10–12 seconds: (1) calls infant's name, approaches, and seats himself next to the infant; (2) talks to the infant; (3) shows the infant a toy; (4) reaches out and lightly touches infant's leg while continuing to talk with the infant; (5) stands up and stretches out his arms, as if to lift the infant. For each of the five phases, each infant affect dimension will be rated on a five-point scale (1 – *absent* to 5 – *very frequent*).

A second trained researcher, who will be blind to the study hypotheses, will score the footage from nine subjects, randomly chosen from the sample (i.e., 18 clips; ~25% of the sample). The ICC used to assess inter-rater reliability for infant looks to their father's face revealed poor/moderate/good/excellent agreement (XX). Percentage agreement and ICCs for infant affect were as follows: % and XX for avoidance and % and XX for fearfulness.

### **Analysis Strategy**

In line with de Rosnay et al. (2006), we hypothesise that infants will modify their reactions in accordance with the condition of observation of their fathers' behaviour towards the stranger (anxious vs neutral). Moreover, we expect the association between paternal behaviour in the two experimental conditions and infant responses to be moderated by infant BI. Specifically, infants high in BI, compared to infants non-high in BI, will display significantly more anxious behaviours in the anxious condition.

We will not exclude any participants based on their performance on the experimental tasks. However, we will exclude the dyad from the study if fathers are not rated as expressing anxiety in the anxious condition (i.e., score 2 SD below the mean for that condition) or are rated as expressing anxiety in the neutral condition (i.e., score 2 SD above the mean for that condition), and/or if infants do not look towards their father during the father-stranger interaction. Electronical data from the screening phase will have been submitted before the experiment begins (i.e., participants will not have the option to skip questions). If a participant decides to withdraw from the laboratory session, when possible, the reasons for the withdrawal will be recorded for the subsequent interpretation of the results. In the laboratory phase, provided that the dyads fully complete the session, the only instance of missing data would be if the electronic devices (i.e., recording tools) fail. In this case, we will exclude the dyad from the study, unless at least 80% of each of the two SR tasks (approx. 72s) has been adequately recorded.

Before proceeding with the main analyses, as a quality check, we will use *t*-tests to assess whether infants' reactions (i.e., fearfulness and avoidance) to the two strangers are comparable or whether there are any significant differences. If a stranger effect emerges, we will account for it as a covariate in the analyses. Some studies suggest that girls may be more sensitive to expressions of parental affect, and react more strongly when their mothers express fear towards a referent (Blackford & Walden, 1998; Gerull & Rapee, 2002), thus we will evaluate whether infant sex plays a role in their responses. We will run a Chi-Square test to examine whether there is an association between infant sex and BI. If the association is significant, we will adjust for the effect of sex, which will be accounted for as a covariate in the analyses. For each infant behaviour, we will compare the neutral and socially anxious conditions, first examining whether order of condition presentation influenced infant responding, and then accounting for the possible influences of infant sex and BI. R Statistical Software version 4.1.2 (R Core Team, 2021) will be used to conduct data analyses for this study. Significance levels will be set at  $\alpha = .05$  for

all statistical tests except analyses of simple effects, where an  $\alpha$  of .01 will be employed. We will adjust for multiple comparisons using the Holm-Bonferroni method.

### ***Infant Looking***

We will first calculate the mean number of infant looks in the direction of the father's face during the father-stranger interaction in both neutral and socially anxious conditions. To examine whether infant looking to father was influenced by order of condition presentation, we will run a mixed-model ANOVA using condition (neutral vs anxious) as the within-subjects factor and order as the between-subjects factor.

### ***Infant Affect***

We will calculate the mean affect scores (i.e., fearfulness and avoidance) during the infant-stranger interaction for both the neutral and socially anxious condition. To determine the potential influence of order presentation, for each affect dimension we will conduct a mixed-model ANOVA using condition as a within-subjects factor and order as a between subjects factor.

**Fearfulness.** To assess whether infant fearfulness was influenced by infant sex or BI, two separate mixed-model ANOVAs will be run, with condition as a within-subjects factor and sex and BI as between-subjects factors. All two-way interactions will be considered.

**Avoidance.** Two mixed-model ANOVAs will be conducted with condition as a within-subjects factor, and sex and BI as between-subjects factors. All two-way interactions will be considered.

### ***Timeline***

Following Stage 1 submission and, eventually, in principle acceptance, we plan to start data collection. We anticipate the data collection, analysis and writing-up to take approximately 12 months. After this process, we will submit the finalised manuscript for re-review (Stage 2).

## **B.1 Paternal Training Videos for the Social Referencing Tasks**

Anxious Dad Video

<https://youtu.be/e59JZisVDV8>

Neutral Dad Video

<https://youtu.be/yiiK8HC8Pw0>

## Appendix C Supplementary Material for Chapter 2

### C.1 Full Search Strategy

We used the following Boolean algorithm to retrieve all the quantitative studies that measured anxiety in fathers and emotional and/or behavioural outcomes in offspring: '(father\* or patern\* or dad\*) AND (anxi\* or worr\* or phobi\* or panic\* or agoraphobi\* or fear\*) AND (transmission or intergeneration\* or 'inter-generation\*' or associat\* or effect\* or role\* or impact\* or relation\*) AND (child\* or offspring\* or infan\* or adolescen\* or teen\* or toddler\* or bab\* or "young person\*" or "young adult\*")'.

#### C.1.1 Ovid Platform

1. APA PsycInfo <1806 to February Week 3 2022>

<https://ezproxy.med.nyu.edu/login?url=http://ovidsp.ovid.com/ovidweb.cgi?T=JS&NEWS=N&PAGE=main&SHAREDSEARCHID=3WM4jnhXyr2Uz8a9qHmzVKskiCmMEH8lTA3jCb6cbVrBBxZnameJLFit9gVWaPmeO>

```

1   (father* or patern* or dad*).ti,ab.    62377
2   father child relations/    4947
3   1 or 2 62590
4   (anxi* or worr* or phobi* or panic* or agoraphobi* or fear*).ti,ab.    315323
5   exp anxiety disorders/    55662
6   4 or 5 328480
7   (transmission or intergeneration* or "inter-generation*" or associat* or effect* or
role* or impact* or relation*).ti,ab.    3049569
8   (Child* or offspring* or infan* or adolescen* or teen* or toddler* or bab* or "young
person*" or "young adult*").ti,ab.    997113
9   3 and 6 and 7 and 8    3191
10  (animal not human).po. 375682
11  9 not 10    3,111

```

2. Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations, Daily and Versions <1946 to February 25, 2022>

## Appendix C

<https://ovidsp.ovid.com/ovidweb.cgi?T=JS&NEWS=N&PAGE=main&SHAREDSEARCHID=7T1DX6LcyOmH0VziQqjZSveW8f9Y2TOptlz8GMSviXaNvFuSUL07JS5TWCripKHoy>

- 1 (father\* or patern\* or dad\*).ti,ab. 94333
- 2 Father-Child Relations/ 3792
- 3 1 or 2 95550
- 4 (anxi\* or worr\* or phobi\* or panic\* or agoraphobi\* or fear\*).ti,ab. 356021
- 5 exp Anxiety Disorders/ 85450
- 6 4 or 5 393632
- 7 (transmission or intergeneration\* or "inter-generation\*" or associat\* or effect\* or role\* or impact\* or relation\*).ti,ab. 14218755
- 8 (Child\* or offspring\* or infan\* or adolescen\* or teen\* or toddler\* or bab\* or "young person\*" or "young adult\*").ti,ab. 2216768
- 9 3 and 6 and 7 and 8 2339
- 10 exp animals/ not humans.sh. 4963784
- 11 9 not 10 **2,247**

### 3. Embase Classic+Embase <1947 to 2022 February 25>

<https://ovidsp.ovid.com/ovidweb.cgi?T=JS&NEWS=N&PAGE=main&SHAREDSEARCHID=7OjwiEZ8wS4gcDued0fAPqjgW5Y6mEpfdF0lRBsAgJUxEO7rXYD2oH5rV2jAGGbl>

- 1 (father\* or patern\* or dad\*).ti,ab. 121649
- 2 father child relation/ 3988
- 3 1 or 2 122678
- 4 (anxi\* or worr\* or phobi\* or panic\* or agoraphobi\* or fear\*).ti,ab. 508137
- 5 exp anxiety disorder/ 283634
- 6 4 or 5 666837
- 7 (transmission or intergeneration\* or "inter-generation\*" or associat\* or effect\* or role\* or impact\* or relation\*).ti,ab. 18569661
- 8 (Child\* or offspring\* or infan\* or adolescen\* or teen\* or toddler\* or bab\* or "young person\*" or "young adult\*").ti,ab. 2993068
- 9 3 and 6 and 7 and 8 3978
- 10 (exp animal/ or exp invertebrate/ or nonhuman/ or animal experiment/ or animal tissue/ or animal model/ or exp plant/ or exp fungus/) not (exp human/ or human tissue/) 8163667
- 11 9 not 10 **3,850**

### C.1.2 Web of Science Core Collection

(Conducted on 28.02.2022)

#1 AND #2 AND #3 AND #4

**2,525**

## Appendix C

(TI=(Child\* or offspring\* or infan\* or adolescen\* or teen\* or toddler\* or bab\* or "young person\*" or "young adult\*")) OR AB=(Child\* or offspring\* or infan\* or adolescen\* or teen\* or toddler\* or bab\* or "young person\*" or "young adult\*"))

2,489,160

(TI=(transmission or intergeneration\* or "inter-generation\*" or associat\* or effect\* or role\* or impact\* or relation\*)) OR AB=(transmission or intergeneration\* or "inter-generation\*" or associat\* or effect\* or role\* or impact\* or relation\*)

25,153,476

(TI=(anxi\* or worr\* or phobi\* or panic\* or agoraphobi\* or fear\*)) OR AB=(anxi\* or worr\* or phobi\* or panic\* or agoraphobi\* or fear\*)

465,618

(TI=(father\* or patern\* or dad\*)) OR AB=(father\* or patern\* or dad\*)

138,311

### **C.1.3 Grey Literature**

1. Trip Database, searched on 23/02/2022.

Keywords: Paternal anxiety, father anxiety, offspring development

Result retained: 1 blog post

2. ProQuest, searched on 24/02/2022.

Keywords: "father anxiety offspring development"

Results:

- dissertations and theses (84,710)
- conference proceedings (18)

Retained: 7 records (theses)

## C.2 Records Excluded from the Meta-analysis

Table C1 Records Excluded at the Full-text Screening Stage, with Reasons

| Author (year)                | Title                                                                                                                                                                                                          | Reasons for exclusion                                    |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Abadi et al. (2021)          | Prevalence of social phobia and its risk factors among students at king khalid university, abha city, saudi arabia                                                                                             | No assessment of anxiety in fathers                      |
| Abe (1978)                   | Parent-child transmission of some childhood behaviour characteristics                                                                                                                                          | No assessment of anxiety in fathers                      |
| Abidin et al. (1992)         | The relationship of early family variables to children's subsequent behavioral adjustment                                                                                                                      | No assessment of anxiety in fathers                      |
| Abraham et al. (1984)        | Navajo and Anglo childrearing behaviors: A cross-cultural comparison                                                                                                                                           | No assessment of anxiety in fathers                      |
| Adedokun (2020)              | Relationships between paternal attachment, fathers' participation in family therapy, and adolescent depression and suicide risk                                                                                | No assessment of anxiety in fathers                      |
| Aguilar Yamuza et al. (2019) | Relationship between Parenting Style and Anxiety in a Spanish Children Sample                                                                                                                                  | No assessment of anxiety in fathers                      |
| Ahmad (2021)                 | Children's fears and its relation to parenting style and demographic variables of children and parents                                                                                                         | No assessment of anxiety in fathers                      |
| Ahmadzadeh et al. (2017)     | Associations between parent and child anxiety are bidirectional: Evidence from mothers and fathers                                                                                                             | Duplicate                                                |
| Aktar et al. (2016)          | Infants' Temperament and Mothers', and Fathers' Depression Predict Infants' Attention to Objects Paired with Emotional Faces                                                                                   | No quantitative emotional/behavioural offspring outcomes |
| Aktar et al. (2018)          | Parental negative emotions are related to behavioral and pupillary correlates of infants' attention to facial expressions of emotion                                                                           | No quantitative emotional/behavioural offspring outcomes |
| Al Husni et al. (2021)       | Inpatient with an anxious school refusal: A retrospective study                                                                                                                                                | No assessment of anxiety in fathers                      |
| Al-Fayez et al. (2012)       | Prevalence of physical, psychological, and sexual abuse among a nationwide sample of Arab high school students: association with family characteristics, anxiety, depression, self-esteem, and quality of life | No assessment of anxiety in fathers                      |
| Al-Ghurairi (2021)           | Prevalence of specific phobia in school student in mosul city- north of Iraq                                                                                                                                   | No assessment of anxiety in fathers                      |
| Al-Jundi and Mahmood (2010)  | Factors affecting preoperative anxiety in children undergoing general anaesthesia for dental rehabilitation                                                                                                    | No assessment of anxiety in fathers                      |
| Al-Yagon et al. (2011)       | Fathers' emotional resources and children's socioemotional and behavioral adjustment among children with learning disabilities                                                                                 | No assessment of anxiety in fathers                      |
| Al-Yagon et al. (2022)       | Children's Resilience to Ongoing Border Attacks: The Role of Father, Mother, and Child Resources                                                                                                               | No assessment of anxiety in fathers                      |
| Allmann et al. (2021)        | Bidirectional and transactional relationships between parenting styles and child symptoms of ADHD, ODD, depression, and anxiety over 6 years                                                                   | No assessment of anxiety in fathers                      |
| Alnoes and Torgersen (1989)  | Clinical differentiation between major depression only, major depression with panic disorder and panic disorder only. Childhood, personality and personality disorder                                          | No assessment of anxiety in fathers                      |
| Alnoes and Torgersen (1990)  | Parental representation in patients with major depression, anxiety disorder and mixed conditions                                                                                                               | No assessment of anxiety in fathers                      |
| Alonso et al. (2004)         | Perceived parental rearing style in obsessive-compulsive disorder: Relation to symptom dimensions                                                                                                              | No assessment of anxiety in fathers                      |

## Appendix C

| Author (year)               | Title                                                                                                                                                                              | Reasons for exclusion                                                                              |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Alpern and Lyonsruth (1993) | Preschool-children at social risk - chronicity and timing of maternal depressive symptoms and child-behavior problems at school and at home                                        | No assessment of anxiety in fathers                                                                |
| Alrojolah et al. (2019)     | 2.28 childhood traumatic life events in Lebanon: prevalence, correlates, and predictors of PTSD                                                                                    | No assessment of anxiety in fathers                                                                |
| Amrock and Weitzman (2014)  | Parental psychological distress and children's mental health: Results of a national survey                                                                                         | No assessment of anxiety in fathers                                                                |
| An and Kochanska (2021)     | Mothers' and fathers' attachment styles and power-assertive control: Indirect associations through parental representations                                                        | No assessment of anxiety in fathers                                                                |
| An and Kochanska (2021)     | Mothers' and Fathers' Attachment Styles and Power-Assertive Control: Indirect Associations Through Parental Representations                                                        | Duplicate                                                                                          |
| Anastasiadou et al. (2016)  | The relationship between dysfunctional family patterns and symptom severity among adolescent patients with eating disorders: A gender-specific approach                            | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Ang and Sin (2021)          | Retrospective Reports of Perceived 'Guan' Parenting: Relationships to Adult Attachment Styles, Emotion Regulation, and Self-Esteem                                                 | No assessment of anxiety in fathers                                                                |
| Angelosante (2006)          | The relationship between expressed emotion and treatment outcome in anxious youth                                                                                                  | No assessment of anxiety in fathers                                                                |
| Anhalt (1999)               | The relation between parenting factors and social anxiety: A retrospective study                                                                                                   | No assessment of anxiety in fathers                                                                |
| Anonymous (2017)            | "Neural reactivity to rewards and losses in offspring of mothers and fathers with histories of depressive and anxiety disorders": Correction to Kujawa, Proudfit, and Klein (2014) | No quantitative emotional/behavioural offspring outcomes                                           |
| Antle et al. (2020)         | The mediating role of family dynamics in the relationship between paternal incarceration and child behavior problems                                                               | No assessment of anxiety in fathers                                                                |
| Anton (1978)                | The relationship between trait anxiety and parent-child interactions in upper elementary school children                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Antunez et al. (2016)       | Parental psychopathology levels as a moderator of temperament and Oppositional Defiant Disorder symptoms in preschoolers                                                           | No assessment of anxiety in fathers                                                                |
| Antunez et al. (2018)       | Reciprocity Between Parental Psychopathology and Oppositional Symptoms From Preschool to Middle Childhood                                                                          | No assessment of anxiety in fathers                                                                |
| Applefield (1999)           | Maternal separation anxiety re-defined as parental separation anxiety                                                                                                              | No quantitative emotional/behavioural offspring outcomes                                           |
| Arabghol et al. (2016)      | Identification and Evaluation of Abused Children at Imam Hossein Hospital                                                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Arabgol et al. (2014)       | Therapeutic intervention and parenting style of abusive parents                                                                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Arana et al. (2021)         | No differential susceptibility or diathesis stress to parenting in early adolescence: Personality facets predicting behaviour problems                                             | No assessment of anxiety in fathers                                                                |
| Arikan et al. (2022)        | A two-generation study: The transmission of attachment and young adults' depression, anxiety, and social media addiction                                                           | No assessment of anxiety in fathers                                                                |
| Arnold et al. (2011)        | Antecedents and consequences of caregiving structure on young mothers and their infants                                                                                            | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)             | Title                                                                                                                                                                                                                                                                                                          | Reasons for exclusion                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Asbrand et al. (2016)     | Maternal expressed emotion and parental fear of negative evaluation in children with social anxiety disorder                                                                                                                                                                                                   | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Aschenbrand et al. (2005) | Discriminant validity and clinical utility of the CBCL with anxiety-disordered youth                                                                                                                                                                                                                           | No assessment of anxiety in fathers                                                                |
| Ask et al. (2014)         | Genetic and environmental causes of variation in adolescent anxiety symptoms: A multiple-rater twin study                                                                                                                                                                                                      | No assessment of anxiety in fathers                                                                |
| Ask et al. (2016)         | Common Etiological Sources of Anxiety, Depression, and Somatic Complaints in Adolescents: A Multiple Rater twin Study                                                                                                                                                                                          | No assessment of anxiety in fathers                                                                |
| Askeland et al. (2019)    | T70 Early manifestations of genetic risk for neurodevelopmental disorders                                                                                                                                                                                                                                      | Duplicate                                                                                          |
| Askeland et al. (2021)    | TU14. Genome-wide association study of childhood social communication and repetitive behavior in the norwegian mother, father and child study (MOBA)                                                                                                                                                           | No assessment of anxiety in fathers                                                                |
| Askeland et al. (2021)    | Early manifestations of genetic risk for neurodevelopmental disorders                                                                                                                                                                                                                                          | No assessment of anxiety in fathers                                                                |
| Asselmann et al. (2015)   | The role of behavioral inhibition and parenting for an unfavorable emotional trauma response and PTSD                                                                                                                                                                                                          | No assessment of anxiety in fathers                                                                |
| Ates and Turkcan (2015)   | Temperament, attachment styles and trait anger of parents to adolescents diagnosed with conduct disorder                                                                                                                                                                                                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Attili et al. (2016)      | Emotional neglect, attachment and separation anxiety in eating disorders: A study on adolescents and their parents                                                                                                                                                                                             | No assessment of anxiety in fathers                                                                |
| Auerbach (2019)           | Probing structural and functional subcortical regions implicated in youth depression                                                                                                                                                                                                                           | No assessment of anxiety in fathers                                                                |
| Austin et al. (2005)      | Maternal trait anxiety, depression and life event stress in pregnancy: relationships with infant temperament                                                                                                                                                                                                   | No assessment of anxiety in fathers                                                                |
| Ayano et al. (2021)       | Associations of maternal and paternal mental health problems with offspring anxiety at age 20 years: Findings from a population-based prospective cohort study                                                                                                                                                 | No assessment of anxiety in fathers                                                                |
| Ayano et al. (2021)       | Maternal and paternal mental health problems and the risk of offspring depression in late adolescence: findings from the Raine study                                                                                                                                                                           | No assessment of anxiety in fathers                                                                |
| Ayano et al. (2021)       | Corrigendum to 'Associations of maternal and paternal mental health problems with offspring anxiety at age 20 years: Findings from a population-based prospective cohort study [Psychiatry Research 298 (2021) 113781] (Psychiatry Research (2021) 298, (S0165178121000780), (10.1016/j.psychres.2021.113781)) | Duplicate                                                                                          |
| Ayano et al. (2021)       | Risk of conduct and oppositional defiant disorder symptoms in offspring of parents with mental health problems: Findings from the Raine Study                                                                                                                                                                  | No assessment of anxiety in fathers                                                                |
| Ayano et al. (2021)       | The impact of parental mental health problems on the educational outcomes of their offspring: Findings from the Raine Study                                                                                                                                                                                    | No assessment of anxiety in fathers                                                                |
| Ayano et al. (2021)       | The impact of parental mental health problems on the educational outcomes of their offspring: Findings from the Raine Study                                                                                                                                                                                    | Duplicate                                                                                          |
| Ayres (2000)              | Obsessive Compulsive Disorder in children and adolescents: A longitudinal study                                                                                                                                                                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Babinski et al. (2016)    | Maternal and paternal psychopathology effects on the social functioning of children with disruptive behavior problems                                                                                                                                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |

## Appendix C

| Author (year)                     | Title                                                                                                                                                           | Reasons for exclusion                                                                              |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Bachem et al. (2018)              | The Role of Parental Posttraumatic Stress, Marital Adjustment, and Dyadic Self-Disclosure in Intergenerational Transmission of Trauma: A Family System Approach | No assessment of anxiety in fathers                                                                |
| Bader et al. (2021)               | Adrenocortical interdependence in father-infant and mother-infant dyads: Attunement or something more?                                                          | No assessment of anxiety in fathers                                                                |
| Baeza et al. (2021)               | Adolescents Who Are Violent Toward Their Parents: An Approach to the Situation in Chile                                                                         | No assessment of anxiety in fathers                                                                |
| Bahtiyar and Gencoz (2021)        | The association between perceived parenting and adulthood anxiety: The mediator roles of emotion regulation, shame and anger                                    | No assessment of anxiety in fathers                                                                |
| Bakker et al. (2014)              | The relationship between behavioural problems in preschool children and parental distress after a paediatric burn event                                         | No assessment of anxiety in fathers                                                                |
| Baldoni et al. (2021)             | Being the Father of a Preterm-Born Child: Contemporary Research and Recommendations for NICU Staff                                                              | No quantitative emotional/behavioural offspring outcomes                                           |
| Ballarotto (2016)                 | Parent-Child Interactions in Families with Mothers who had Experienced Early Relational Traumas                                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| Bamvita et al. (2017)             | Childhood predictors of adult psychopathy scores among males followed from age 6 to 33                                                                          | No assessment of anxiety in fathers                                                                |
| Baral and de Guzman (2021)        | Anxieties and Coping among Filipino New Fathers with Postnatal Depression                                                                                       | No assessment of anxiety in fathers                                                                |
| Barrera and Atenafu (2009)        | Symptoms of depression and anxiety, coping and quality of life of mothers and fathers prior to pediatric stem cell transplantation                              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Barrera and Garrison-Jones (1992) | Family and peer social support as specific correlates of adolescent depressive symptoms                                                                         | No assessment of anxiety in fathers                                                                |
| Bartle-Haring et al. (2002)       | The impact of parental separation anxiety on identity development in late adolescence and early adulthood                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| Basay et al. (2020)               | Hospitalized children: A study on the factors affecting psychosocial adjustment                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Basili et al. (2021)              | Maternal and paternal psychological control and adolescents' negative adjustment: A dyadic longitudinal study in three countries                                | No assessment of anxiety in fathers                                                                |
| Batal et al. (2021)               | First Nations households living on-reserve experience food insecurity: prevalence and predictors among ninety-two First Nations communities across Canada       | No assessment of anxiety in fathers                                                                |
| Batten et al. (2010)              | Psychiatric disorders in offspring of parents with major depressive disorder                                                                                    | No assessment of anxiety in fathers                                                                |
| Baude and Gaudron (2013)          | Socioemotional adjustment of children aged 4 to 12 years old in joint physical custody: An ecosystemic approach                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Beauchaine et al. (2005)          | Mediators, moderators, and predictors of 1-year outcomes among children treated for early-onset conduct problems: A latent growth curve analysis                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Becker et al. (2021)              | Deleterious and Protective Psychosocial and Stress-Related Factors Predict Risk of Spontaneous Preterm Birth                                                    | No assessment of anxiety in fathers                                                                |
| Bekci (2021)                      | The Effect of Environmental Factors on Children from The Viewpoint of Parents                                                                                   | No assessment of anxiety in fathers                                                                |
| Bekkhus et al. (2021)             | Maternal Anxiety and Infants Birthweight and Length of Gestation. A sibling design                                                                              | No assessment of anxiety in fathers                                                                |
| Bell et al. (2019)                | Children of parents who have been hospitalised with psychiatric disorders are at risk of poor school readiness                                                  | No quantitative emotional/behavioural offspring outcomes                                           |

## Appendix C

| Author (year)                   | Title                                                                                                                                                                                    | Reasons for exclusion                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Bellido-González et al. (2019)  | Psychological distress and resilience of mothers and fathers with respect to the neurobehavioral performance of small-for-gestational-age newborns                                       | No assessment of anxiety in fathers                                                                |
| Ben-Knaz (2002)                 | Family interaction in differentially diagnosed academically-able male adolescent underachievers                                                                                          | No assessment of anxiety in fathers                                                                |
| Berg et al. (2019)              | Parental PTSD and school performance in 16-year-olds-a Swedish national cohort study                                                                                                     | No assessment of anxiety in fathers                                                                |
| Berg et al. (2021)              | Parental post-traumatic stress and psychiatric care utilisation among refugee adolescents                                                                                                | No assessment of anxiety in fathers                                                                |
| Bergental (1981)                | The relationship of father support and father availability to adolescent sons' experience of loneliness and separation anxiety                                                           | No assessment of anxiety in fathers                                                                |
| Bernard and Flavigny (1965)     | The role of the father in obsessions of children                                                                                                                                         | No assessment of anxiety in fathers                                                                |
| Bernstein and Borchardt (1996)  | School refusal: Family constellation and family functioning                                                                                                                              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Besharat (2003)                 | Parental perfectionism and children's test anxiety                                                                                                                                       | No assessment of anxiety in fathers                                                                |
| Betancourt et al. (2020)        | Promoting parent-child relationships and preventing violence via home-visiting: a pre-post cluster randomised trial among Rwandan families linked to social protection programmes        | No quantitative emotional/behavioural offspring outcomes                                           |
| Betts et al. (2014)             | Maternal depressive, anxious, and stress symptoms during pregnancy predict internalizing problems in adolescence                                                                         | No assessment of anxiety in fathers                                                                |
| Betts et al. (2015)             | The relationship between maternal depressive, anxious, and stress symptoms during pregnancy and adult offspring behavioral and emotional problems                                        | No assessment of anxiety in fathers                                                                |
| Bhattacharya et al. (1984)      | Socio-economic correlates of fertility and contraceptive practices amongst target couples of a rural community                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Bi et al. (2007)                | Effect of behavior inhibition and parental behavior to adolescents' anxiety                                                                                                              | No assessment of anxiety in fathers                                                                |
| Biao-Bin and Xue (2006)         | Parental Rearing Patterns and Social Anxiety of Primary School Students in Country                                                                                                       | No assessment of anxiety in fathers                                                                |
| Bieleninik et al. (2021)        | Paternal Postpartum Bonding and Its Predictors in the Early Postpartum Period: Cross-Sectional Study in a Polish Cohort                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Bilgic et al. (2013)            | The relationship between anxiety disorders, anxiety sensitivity and deliberate self harm in adolescents with depression                                                                  | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Bilodeau-Houle and Marin (2019) | Impact of parent-child relationship quality on children's physiological reactivity during an observational fear learning protocol                                                        | No assessment of anxiety in fathers                                                                |
| Bilodeau-Houle et al. (2020)    | Anxiety Sensitivity Moderates the Association Between Father-Child Relationship Security and Fear Transmission                                                                           | No assessment of anxiety in fathers                                                                |
| Binbay et al. (2012)            | Investigation of the presence of depression, the ways of coping with stress and the features of temperament and character among first degree relatives of patients with major depression | No quantitative emotional/behavioural offspring outcomes                                           |
| Birtchnell (1993)               | Does recollection of exposure to poor maternal care in childhood affect later ability to relate?                                                                                         | No assessment of anxiety in fathers                                                                |
| Bjørngaard et al. (2015)        | Association of Body Mass Index with Depression, Anxiety and Suicide-An Instrumental Variable Analysis of the HUNT Study                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |

## Appendix C

| Author (year)                | Title                                                                                                                                                     | Reasons for exclusion                                                                              |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Bjornsson (1975)             | Mental disorders in Icelandic children                                                                                                                    | Review/commentary papers and research protocols (no new data/findings)                             |
| Black et al. (2020)          | Associations between Parental Psychopathology and Sexual Behavior in an Outpatient Psychiatric Sample                                                     | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Blake et al. (1975)          | Parents of babies of very low birth weight: long-term follow-up                                                                                           | Review/commentary papers and research protocols (no new data/findings)                             |
| Blake et al. (2014)          | Parent psychological adjustment, donor conception and disclosure: A follow-up over 10 years                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Bocknek et al. (2021)        | Paternal biopsychosocial resilience in triadic interactions among African American/Black families exposed to trauma and socioeconomic adversity           | No assessment of anxiety in fathers                                                                |
| Boenisch-alert et al. (2013) | Mentally ill parents in psychiatric outpatient care: Results of the study 'HELP-S for Children'                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Bogels and Siqueland (2006)  | Family cognitive behavioral therapy for children and adolescents with clinical anxiety disorders                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Bohr et al. (2021)           | The Crying Clinic: Increasing accessibility to Infant Mental Health services for immigrant parents at risk for peripartum depression                      | No quantitative emotional/behavioural offspring outcomes                                           |
| Bonassi et al. (2021)        | Serotonin transporter gene polymorphisms and maternal overprotection regulate adult social expectations on close relationships                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Bonassi et al. (2021)        | P.112 Effect of early paternal caregiving and genotype rs25531 polymorphisms on the adult relationship with the partner                                   | No assessment of anxiety in fathers                                                                |
| Boomsma et al. (2005)        | Genetic and environmental influences on Anxious/Depression during childhood: A study from the Netherlands Twin Register                                   | No assessment of anxiety in fathers                                                                |
| Bourgou et al. (2021)        | Profile of the victims of sexual violence in child psychiatry consultation                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Bowie et al. (2013)          | The role of culture in parents' socialization of children's emotional development                                                                         | No assessment of anxiety in fathers                                                                |
| Bragado et al. (1999)        | Risk factors for behavioral, anxiety, depressive and elimination disorders in children and adolescents                                                    | No assessment of anxiety in fathers                                                                |
| Brand (2002)                 | The role of perceived discrepancies in parental emotion socialization practices in the relation between marital adjustment and adolescent psychopathology | No assessment of anxiety in fathers                                                                |
| Braun (2007)                 | Gay fathers with children adopted from foster care: Understanding their experiences and predicting adoption outcomes                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Breaux et al. (2014)         | The role of parent psychopathology in the development of preschool children with behavior problems                                                        | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Breaux et al. (2016)         | The Role of Parent Psychopathology in Emotion Socialization                                                                                               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Breinholst et al. (2021)     | A therapist-guided parent-delivered self-help group for anxiety disorders in children: An effectiveness study                                             | No assessment of anxiety in fathers                                                                |
| Bretana et al. (1996)        | Psychological and family characteristics of type A adolescents                                                                                            | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |

## Appendix C

| Author (year)                | Title                                                                                                                                                                                                                                 | Reasons for exclusion                                                                              |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Bridges et al. (1973)        | A comparative review of patients with obsessional neurosis and with depression treated by psychosurgery                                                                                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Bringle and Bagby (1992)     | Self-esteem and perceived quality of romantic and family relationships in young adults                                                                                                                                                | No assessment of anxiety in fathers                                                                |
| Brook et al. (2008)          | Risk factors for distress in the adolescent children of HIV-positive and HIV-negative drug-abusing fathers                                                                                                                            | No assessment of anxiety in fathers                                                                |
| Brooker et al. (2017)        | Erratum: Early inherited risk for anxiety moderates the association between fathers' child-centered parenting and early social inhibition - CORRIGENDUM (Journal of developmental origins of health and disease (2016) 7 6 (602-615)) | Duplicate                                                                                          |
| Brooker et al. (2017)        | Early inherited risk for anxiety moderates the association between fathers' child-centered parenting and early social inhibition (vol 7, pg 602, 2016)                                                                                | Duplicate                                                                                          |
| Brown et al. (2021)          | Parenting behaviour and paranoia: a network analysis and results from the National Comorbidity Survey-Adolescents (NCS-A)                                                                                                             | No quantitative emotional/behavioural offspring outcomes                                           |
| Bruno (2011)                 | Language brokering and internalizing symptomatology in U.S. Latino youth: The importance of examining family-related and demographic variables                                                                                        | No assessment of anxiety in fathers                                                                |
| Buikhuisen (1985)            | Parental home and deviance                                                                                                                                                                                                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Bulus and Samur (2017)       | The Role of Respect for Parental Self, Essential Needs and Self-efficacy in Predicting the Social Emotional Adjustment of Five/Six-Year-Old Children                                                                                  | No assessment of anxiety in fathers                                                                |
| Burstein and Ginsburg (2010) | The effect of parental modeling of anxious behaviors and cognitions in school-aged children: An experimental pilot study                                                                                                              | No assessment of anxiety in fathers                                                                |
| Bush and Cockrell (1987)     | Maternal factors predicting parenting behaviors in the pediatric clinic                                                                                                                                                               | No assessment of anxiety in fathers                                                                |
| Buttitta et al. (2019)       | In a father's mind: paternal reflective functioning, sensitive parenting, and protection against socioeconomic risk                                                                                                                   | No assessment of anxiety in fathers                                                                |
| Butts and Sporkowski (1974)  | Unwed pregnancy decisions: some background factors                                                                                                                                                                                    | No assessment of anxiety in fathers                                                                |
| Bynion et al. (2017)         | Dimensions of parenting among mothers and fathers in relation to social anxiety among female adolescents                                                                                                                              | No assessment of anxiety in fathers                                                                |
| Cajiao-Nieto et al. (2021)   | Paternal symptoms of anxiety and depression in the first month after childbirth: A comparison between fathers of full term and preterm infants                                                                                        | No quantitative emotional/behavioural offspring outcomes                                           |
| Calear et al. (2021)         | Help-seeking attitudes and intentions for generalised anxiety disorder in adolescents: the role of anxiety literacy and stigma                                                                                                        | No assessment of anxiety in fathers                                                                |
| Calkins and Brock (2021)     | Attachment anxiety and avoidance predict postnatal partner support through impaired affective communication                                                                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Campbell and Gilmore (2009)  | Fathers as informants of children's fears and worries                                                                                                                                                                                 | No assessment of anxiety in fathers                                                                |
| Canals Sans et al. (2015)    | Gender differences in risk factors of infant psychopathological symptoms                                                                                                                                                              | No quantitative emotional/behavioural offspring outcomes                                           |
| Canestrari et al. (2021)     | Parental attachment and cyberbullying victims: The mediation effect of gelotophobia                                                                                                                                                   | No assessment of anxiety in fathers                                                                |
| Capozzi et al. (2018)        | Children's and parent's psychological profiles in selective mutism and generalized anxiety disorder: a clinical study                                                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Cappelli et al. (2013)       | Parental affectionless control and narcissism as predictors of depression and trait-anxiety in the offspring                                                                                                                          | No assessment of anxiety in fathers                                                                |

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| Author (year)             | Title                                                                                                                                                                                                 | Reasons for exclusion                                                                              |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Capron et al. (2015)      | Testing the long-term psychiatric effects of fetal programming: Comparing the association of maternal and paternal prenatal anxiety and depression and offspring anxiety disorders at 18 years of age | Duplicate                                                                                          |
| Carhart (2012)            | Differential impact of parent functioning on infant social emotional functioning during the transition to parenthood                                                                                  | No assessment of anxiety in fathers                                                                |
| Carlson and Jean (1998)   | Parental socialization of infants and preschoolers: The role of gender and temperament                                                                                                                | No assessment of anxiety in fathers                                                                |
| Casale et al. (2021)      | Psychiatric comorbidities, sexual health and neurodevelopmental outcomes of offspring in men with epilepsy                                                                                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Casey et al. (2011)       | Fathers in assisted reproduction families: Quality of parenting, psychological well-being, and father-child relationships at age 7                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Castel et al. (2016)      | Effects of an intervention program on maternal and paternal parenting stress after preterm birth: A randomized trial                                                                                  | No assessment of anxiety in fathers                                                                |
| Castro-Vale et al. (2019) | Intergenerational transmission of war-related trauma assessed 40 years after exposure                                                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Celik et al. (2021)       | Hypernatremic Dehydration Risk Factors in Newborns: Prospective Case-Controlled Study                                                                                                                 | No assessment of anxiety in fathers                                                                |
| Champion et al. (2013)    | Twin family case-control study on adolescent non-specific low back pain: Investigating heritability and comorbidities                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Chan (2021)               | The Role of Father Involvement and Intimate Partner Violence on Postnatal Depression Among Women With Unintended Pregnancy                                                                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Chan et al. (2013)        | A twin family case-control study on paediatric non-specific low back pain: Investigating heritability and comorbidities                                                                               | Duplicate                                                                                          |
| Chang et al. (2013)       | Father's parenting and father-child relationship among children and adolescents with attention-deficit/hyperactivity disorder                                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Chartier et al. (2021)    | Parental peritraumatic distress and feelings of parental competence in relation to COVID-19 lockdown measures: What is the impact on children's peritraumatic distress?                               | No assessment of anxiety in fathers                                                                |
| Chasson et al. (2022)     | Parenthood in the shadow of COVID-19: The contribution of gender, personal resources and anxiety to first time parents' perceptions of the infant                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Chasson et al. (2022)     | Parenthood in the shadow of covid-19: The contribution of gender, personal resources and anxiety to first time parents' perceptions of the infant                                                     | Duplicate                                                                                          |
| Cheesman et al. (2020)    | How important are parents in the development of child anxiety and depression? A genomic analysis of parent-offspring trios in the Norwegian Mother Father and Child Cohort Study (MoBa)               | No assessment of anxiety in fathers                                                                |
| Chen et al. (2003)        | Parenting practice and behavior inhibition of 2-year-old toddlers                                                                                                                                     | No assessment of anxiety in fathers                                                                |
| Chen et al. (2014)        | The relationship of family characteristics and bipolar disorder using causal-pie models                                                                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Cheron et al. (2009)      | Assessment of parental experiential avoidance in a clinical sample of children with anxiety disorders                                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Chevalier et al. (2021)   | The Relationship Between Parental Accommodation and Sleep-Related Problems in Children with Anxiety                                                                                                   | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                     | Title                                                                                                                                                                              | Reasons for exclusion                                                                              |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Choate et al. (2005)              | Parent-Child Interaction therapy for treatment of separation anxiety disorder in young children: A pilot study                                                                     | No assessment of anxiety in fathers                                                                |
| Choate-Summers (2006)             | The role of control in anxiety in children and adolescents                                                                                                                         | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Choe et al. (2021)                | Parental psychological control perceived in adolescence predicts jealousy toward romantic partners in emerging adulthood via insecure attachment                                   | No assessment of anxiety in fathers                                                                |
| Choi (2022)                       | Maternal and paternal parenting stress and children's aggression and anxiety/depression: Children's self-regulation as a moderator                                                 | No assessment of anxiety in fathers                                                                |
| Choudhury (2005)                  | The role of parent-training in the treatment of anxiety disorders in children and adolescents                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Chronis et al. (2003)             | Psychopathology and substance abuse in parents of young children with attention-deficit/hyperactivity disorder                                                                     | No assessment of anxiety in fathers                                                                |
| Chun (1996)                       | Intergenerational dynamics in three-generation families: Adult's emotional ties and their psychological well-being                                                                 | No assessment of anxiety in fathers                                                                |
| Chung et al. (2016)               | Effect of co-sleeping and caregiver factors on infant sleep and physical stress reactivity                                                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Ciuhan (2021)                     | Relationship between permissive parenting style and atypical behaviour in preschool children, with generalized anxiety as mediator                                                 | No assessment of anxiety in fathers                                                                |
| Clarke-Stewart and Hayward (1996) | Advantages of father custody and contact for the psychological well-being of school-age children                                                                                   | No assessment of anxiety in fathers                                                                |
| Clayborne et al. (2021)           | Prenatal maternal stress, child internalizing and externalizing symptoms, and the moderating role of parenting: Findings from the norwegian mother, father, and child cohort study | No assessment of anxiety in fathers                                                                |
| Clemens et al. (2021)             | The mediating role of COVID-19-related burden in the association between adverse childhood experiences and emotional exhaustion: results of the egePan - VOICE study               | No quantitative emotional/behavioural offspring outcomes                                           |
| Clement et al. (2019)             | Prevalence and associated factors of depression symptoms in fathers of children aged 6 months to 17 years in Quebec                                                                | No quantitative emotional/behavioural offspring outcomes                                           |
| Clifford et al. (2011)            | Serotonin transporter genotype moderates the association between socioeconomic status and anxiety in children                                                                      | No assessment of anxiety in fathers                                                                |
| Cohen (1973)                      | Anxiety as a manifestation of associated drives and events in a female schizophrenic patient                                                                                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Cohen and Tsiouris (2006)         | Maternal recurrent mood disorders and high-functioning autism                                                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Cohen et al. (1951)               | The high familial prevalence of neurocirculatory asthenia (anxiety neurosis, effort syndrome)                                                                                      | No assessment of anxiety in fathers                                                                |
| Cohen et al. (2019)               | Paternal antidepressant use as a negative control for maternal use: assessing familial confounding on gestational length and anxiety traits in offspring                           | No assessment of anxiety in fathers                                                                |
| Cohen-Cymerknoh (2021)            | Extra-pulmonary complications in cystic fibrosis                                                                                                                                   | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Colas Sanjuan (2001)              | Reflection on depression in infancy and its relation with narcissism: The myth of the happy child                                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Collin et al. (2015)              | Maternal and childhood psychological factors predict chronic disabling fatigue at age 13 years                                                                                     | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                | Title                                                                                                                                                                                                 | Reasons for exclusion                                                                              |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Condoluci et al. (2019)      | Correlation between parental psychopathology and stress index with the adaptive emotional functioning in children with disabilities admitted to the pediatric service IRCCS San Raffaele Pisana, Rome | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Conklin (2012)               | An exploratory study of variables related to behavior problems and parent/peer relationship problems for adolescents referred to an outpatient clinic                                                 | No assessment of anxiety in fathers                                                                |
| Cooper et al. (2006)         | Affective disorder in the parents of a clinic sample of children with anxiety disorders                                                                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Copenhaver and Eisler (2000) | The development and validation of the attitude toward father scale: A tool for assessing the father's role in children's behavior problems                                                            | No assessment of anxiety in fathers                                                                |
| Cornelius et al. (2001)      | Correlates of mental health service utilization and unmet need among a sample of male adolescents                                                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Cornell (1989)               | Child adjustment and parent use of the term "gifted."                                                                                                                                                 | No assessment of anxiety in fathers                                                                |
| Corpuz et al. (2021)         | The postnatal testosterone rebound in first-time fathers and the quality and quantity of paternal care                                                                                                | No assessment of anxiety in fathers                                                                |
| Correia and Mota (2017)      | Role of family environment in the development of psychopathological symptoms in young adults                                                                                                          | No assessment of anxiety in fathers                                                                |
| Cowan (2008)                 | Trauma exposure and behavioral outcomes in sheltered homeless children: The moderating role of perceived social support                                                                               | No assessment of anxiety in fathers                                                                |
| Coyne et al. (2011)          | Game on... girls: Associations between co-playing video games and adolescent behavioral and family outcomes                                                                                           | No assessment of anxiety in fathers                                                                |
| Cranley (1981)               | Roots of attachment: The relationship of parents with their unborn                                                                                                                                    | No quantitative emotional/behavioural offspring outcomes                                           |
| Crockenberg et al. (2007)    | Pathways from marital aggression to infant emotion regulation: The development of withdrawal in infancy                                                                                               | No assessment of anxiety in fathers                                                                |
| Cucu Ciuhan (2021)           | Relationship between permissive parenting style and atypical behaviour in preschool children, with generalized anxiety as mediator                                                                    | No assessment of anxiety in fathers                                                                |
| Cui et al. (2022)            | Parent-Child Communication, Relationship Quality, and Female Young Adult Children's Well-Being in US and Finland                                                                                      | No assessment of anxiety in fathers                                                                |
| Culp et al. (1989)           | A tool for educating parents about their premature infants                                                                                                                                            | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Cummings (1976)              | The impact of the child's deficiency on the father: a study of fathers of mentally retarded and of chronically ill children                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Curtiss (1999)               | Psychopathology and psychosocial functioning in adult male offspring of depressed or alcoholic parents                                                                                                | No assessment of anxiety in fathers                                                                |
| D'Agostino (2015)            | A comparative adoption study analyzing adolescent psychological adjustment outcomes from gay father and heterosexual couples: An attachment theory perspective                                        | No assessment of anxiety in fathers                                                                |
| Dan (1995)                   | Secondary traumatization in the adolescent offspring of Vietnam veterans with Posttraumatic Stress Disorder                                                                                           | No assessment of anxiety in fathers                                                                |
| Darwiche (2011)              | Assessment of early family triadic interactions                                                                                                                                                       | No assessment of anxiety in fathers                                                                |
| Daskalakis et al. (2021)     | Intergenerational trauma is associated with expression alterations in glucocorticoid- and immune-related genes                                                                                        | No quantitative emotional/behavioural offspring outcomes                                           |
| Daud et al. (2005)           | Children in families of torture victims: Transgenerational transmission of parents' traumatic experiences to their children                                                                           | No assessment of anxiety in fathers                                                                |
| Daidsen et al. (2022)        | Mental and pediatric disorders among children 0-6 years of parents with severe mental illness                                                                                                         | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                          | Title                                                                                                                                                       | Reasons for exclusion                                                                              |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Davies et al. (2021)                   | Maternal and paternal unsupportive parenting and children's externalizing symptoms: The mediational role of children's attention biases to negative emotion | No assessment of anxiety in fathers                                                                |
| Davis et al. (2021)                    | Exploring the Effects of Parental Involvement on Broad and Specific Dimensions of Behavioral Problems in Adolescence                                        | No assessment of anxiety in fathers                                                                |
| De Alvarenga et al. (2013)             | Obsessive-compulsive symptom dimensions in school age children and their first degree relatives: Results from a large community-based study                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| De Bellis et al. (2001)                | Psychiatric co-morbidity in caregivers and children involved in maltreatment: A pilot research study with policy implications                               | No assessment of anxiety in fathers                                                                |
| de Castro Morais Machado et al. (2018) | Does Parental Anxiety, Coping, and Pain Catastrophizing Influence Child Behavior During Sedation?                                                           | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| De Cock et al. (2016)                  | Continuous feelings of love? The parental bond from pregnancy to toddlerhood                                                                                | No assessment of anxiety in fathers                                                                |
| de Kruijff et al. (2021)               | Parental Stress and Scalp Hair Cortisol in Excessively Crying Infants: A Case Control Study                                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| de Lijster et al. (2020)               | Familial Aggregation of Cognitive Biases for Children with Anxiety Disorders                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| De Mendonca (1975)                     | Reflexions of a child psychiatrist on children of an alcoholic father                                                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| De Minzi (2010)                        | Different factors affecting psychological development of children at risk due to poverty. Possibilities of intervention                                     | No assessment of anxiety in fathers                                                                |
| de Roos et al. (2021)                  | Predictors and moderators of treatment outcome for single incident paediatric PTSD: a multi-centre randomized clinical trial                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| De Wever and Quaglini (2017)           | Risk factors and psychological vulnerabilities to binge-drinking in youth                                                                                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Deater-Deckard et al. (2017)           | Paternal separation anxiety: Relationships with parenting stress, child-rearing attitudes, and maternal anxieties                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| DeKlyen et al. (2006)                  | The mental health of married, cohabiting, and non-coresident parents with infants                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Del Rio et al. (2021)                  | Early sources of children's math achievement in Chile: The role of parental beliefs and feelings about math                                                 | No assessment of anxiety in fathers                                                                |
| Delannes et al. (2006)                 | Transmission of attachment and family functioning in female adolescents with anorexia nervosa                                                               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Delaunay et al. (2008)                 | Oppositional Defiant Disorder and family tyranny: towards individuation of clinical subtypes                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Demir et al. (2013)                    | Prevalence and some psychosocial characteristics of social anxiety disorder in an urban population of Turkish children and adolescents                      | No assessment of anxiety in fathers                                                                |
| deMontigny et al. (2013)               | Psychosocial factors associated with paternal postnatal depression                                                                                          | No assessment of anxiety in fathers                                                                |
| Derks et al. (2004)                    | A study of genetic and environmental influences on maternal and paternal CBCL syndrome scores in a large sample of 3-year-old Dutch twins                   | No assessment of anxiety in fathers                                                                |
| Di Pierro et al. (2012)                | Adolescent nonsuicidal self-injury: The effects of personality traits, family relationships and maltreatment on the presence and severity of behaviours     | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                | Title                                                                                                                                                                          | Reasons for exclusion                                                                              |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Dierker et al. (1999)        | Influence of parental concordance for psychiatric disorders on psychopathology in offspring                                                                                    | No assessment of anxiety in fathers                                                                |
| Dittman et al. (2011)        | An epidemiological examination of parenting and family correlates of emotional problems in young children                                                                      | No assessment of anxiety in fathers                                                                |
| Doi et al. (2022)            | Association of adverse childhood experiences with postpartum depression and anxiety in fathers: A prospective study                                                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Dooley et al. (2015)         | The risk and protective factors associated with depression and anxiety in a national sample of Irish adolescents                                                               | No assessment of anxiety in fathers                                                                |
| Doyle et al. (2000)          | Child attachment security and self-concept: Associations with mother and father attachment style and marital quality                                                           | No assessment of anxiety in fathers                                                                |
| Drabick et al. (2004)        | ODD and ADHD symptoms in Ukrainian children: External validators and comorbidity                                                                                               | No assessment of anxiety in fathers                                                                |
| Drasgow (1957)               | Problems of progeny related to paternal education                                                                                                                              | No assessment of anxiety in fathers                                                                |
| Dubois-Comtois et al. (2021) | Paternal distress and child behavior problems in low-SES families: Quality of father-child interactions as mediators                                                           | No assessment of anxiety in fathers                                                                |
| Duchesne and Ratelle (2014)  | Attachment security to mothers and fathers and the developmental trajectories of depressive symptoms in adolescence: which parent for which trajectory?                        | No assessment of anxiety in fathers                                                                |
| Duclos et al. (2014)         | Expressed emotion in anorexia nervosa: What is inside the "black box"?                                                                                                         | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Dukanac et al. (2012)        | Primary identification models and their effects on the developmen of adolescent psychopathology                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Dunn et al. (2011)           | Profiles of family-focused adverse experiences through childhood and early adolescence: The ROOTS project a community investigation of adolescent mental health                | No assessment of anxiety in fathers                                                                |
| Duschinsky (2018)            | Disorganization, fear and attachment: Working towards clarification                                                                                                            | No quantitative emotional/behavioural offspring outcomes                                           |
| East (2005)                  | Familial association of anxiety sensitivity and its relation to psychopathology                                                                                                | No assessment of anxiety in fathers                                                                |
| East et al. (2007)           | Familial association of anxiety sensitivity and psychopathology                                                                                                                | No assessment of anxiety in fathers                                                                |
| Eastwick and Finkel (2012)   | The evolutionary armistice: Attachment bonds moderate the function of ovulatory cycle adaptations                                                                              | No assessment of anxiety in fathers                                                                |
| Edwards et al. (2010)        | Prediction of anxiety symptoms in preschool-aged children: examination of maternal and paternal perspectives                                                                   | No assessment of anxiety in fathers                                                                |
| Efrati and Gola (2019)       | Adolescents' compulsive sexual behavior: The role of parental competence, parents' psychopathology, and quality of parent-child communication about sex                        | No assessment of anxiety in fathers                                                                |
| Egberts et al. (2016)        | Child and adolescent internalizing and externalizing problems 12 months postburn: the potential role of preburn functioning, parental posttraumatic stress, and informant bias | No assessment of anxiety in fathers                                                                |
| Ehrenreich et al. (2009)     | Assessment of relevant parenting factors in families of clinically anxious children: The family assessment clinician-rated interview (FACI)                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Eiden et al. (2009)          | A conceptual model predicting anxiety in middle childhood among children of alcoholic and non-alcoholic fathers: The role of marital aggression                                | Duplicate                                                                                          |
| Eiden et al. (2009)          | A conceptual model predicting internalizing problems in middle childhood among children of alcoholic and nonalcoholic fathers: The role of marital aggression                  | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                  | Title                                                                                                                                                                                                 | Reasons for exclusion                                                                              |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Eizaguirre et al. (2000)       | Expressed emotion and personality psychopathology and dyadic adjustment in parents of schizophrenic patients                                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Ellwanger (1995)               | Adolescent cohesion/attachment to parents: Relationships with parental attachment style, marital satisfaction, and separation anxiety                                                                 | No assessment of anxiety in fathers                                                                |
| Engel et al. (1994)            | Parent-child agreement on ratings of anxiety in children                                                                                                                                              | No assessment of anxiety in fathers                                                                |
| Epkins (1996)                  | Affective confounding in social anxiety and dysphoria in children: Child, mother, and father reports of internalizing behaviors, social problems, and competence domains                              | No assessment of anxiety in fathers                                                                |
| Erichsen (1973)                | The father of schizophrenics                                                                                                                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Esbjorn et al. (2013)          | Anxiety levels in clinically referred children and their parents: examining the unique influence of self-reported attachment styles and interview-based reflective functioning in mothers and fathers | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Fallu et al. (2012)            | Substance use among adolescents: Moderating effects of anxiety                                                                                                                                        | No assessment of anxiety in fathers                                                                |
| Fals-Stewart et al. (2003)     | Predictors of the psychosocial adjustment of children living in households of parents in which fathers abuse drugs: The effects of postnatal parental exposure                                        | No assessment of anxiety in fathers                                                                |
| Fanti and Lordos (2021)        | Parental Antisocial and Psychopathic Traits Influence Adolescent Psychopathology                                                                                                                      | No assessment of anxiety in fathers                                                                |
| Farazi et al. (2012)           | The relationship between perceived parenting styles and dimensions of perfectionism with test anxiety in female students in Birj                                                                      | No assessment of anxiety in fathers                                                                |
| Farnia et al. (2020)           | The prevalence of internalizing and externalizing behavior problems and their relationship with demographic characteristics in children surviving the 2017 earthquake in west of Iran                 | No assessment of anxiety in fathers                                                                |
| Faro (2018)                    | Connecting the dots: Examining the impact of parent psychopathology and emotion socialization on youth internalizing symptoms through social connectedness                                            | No assessment of anxiety in fathers                                                                |
| Fatemeh et al. (2012)          | The evaluation of efficacy of the positive parenting for parents in order improvement of relationship with their adolescents                                                                          | No assessment of anxiety in fathers                                                                |
| Favaro and Santonastaso (1995) | Effects of parents' psychological characteristics and eating behaviour on childhood obesity and dietary compliance                                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Fazli and Kavandi (2015)       | Parents's Anxiety on Children Cooperation at Dental Visit                                                                                                                                             | No assessment of anxiety in fathers                                                                |
| Feeley et al. (2007)           | Mothers and fathers of very low-birthweight infants: Similarities and differences in the first year after birth                                                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| Fein (1976)                    | The first weeks of fathering: The importance of choices and supports for new parents                                                                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Feldman et al. (1997)          | Change in mother-infant interactive behavior: Relations to change in the mother, the infant, and the social context                                                                                   | No assessment of anxiety in fathers                                                                |
| Feldman et al. (2011)          | Maternal and paternal plasma, salivary, and urinary oxytocin and parent-infant synchrony: Considering stress and affiliation components of human bonding                                              | No assessment of anxiety in fathers                                                                |
| Feldman et al. (2014)          | Affiliation buffers stress: Cumulative genetic risk in oxytocin-vasopressin genes combines with early caregiving to predict PTSD in war-exposed young children                                        | No assessment of anxiety in fathers                                                                |
| Fenton (1998)                  | Familial correlates of anxiety and depression in high-risk offspring                                                                                                                                  | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                       | Title                                                                                                                                                                  | Reasons for exclusion                                                                                                                                                                                      |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fenzel (1992)                       | The effect of relative age on self-esteem, role strain, GPA, and anxiety                                                                                               | No assessment of anxiety in fathers                                                                                                                                                                        |
| Ferketich and Mercer (1995)         | Predictors of role competence for experienced and inexperienced fathers                                                                                                | No quantitative emotional/behavioural offspring outcomes                                                                                                                                                   |
| Fernandez-Mendoza et al. (2013)     | Cognitive-emotional hyperarousal in the offspring of parents vulnerable to insomnia: A nuclear family study                                                            | Duplicate                                                                                                                                                                                                  |
| Festen et al. (2013)                | Temperament and parenting predicting anxiety change in cognitive behavioral therapy: The role of mothers, fathers, and children                                        | No assessment of anxiety in fathers                                                                                                                                                                        |
| Field et al. (2007)                 | Parent-child relationships and the verbal information pathway to fear in children: Two preliminary experiments                                                         | No assessment of anxiety in fathers                                                                                                                                                                        |
| Fiese (1993)                        | Family rituals in alcoholic and nonalcoholic households - relations to adolescent health symptomatology and problem drinking                                           | No assessment of anxiety in fathers                                                                                                                                                                        |
| Findling et al. (2010)              | Characteristics of children with elevated symptoms of mania: The Longitudinal Assessment of Manic Symptoms (LAMS) study                                                | No assessment of anxiety in fathers                                                                                                                                                                        |
| Finklestein et al. (2020)           | Adolescents' individual resilience and its association with security threats, anxiety and family resilience                                                            | Duplicate                                                                                                                                                                                                  |
| Finsaas (2021)                      | The neglected clinical problem of adult separation anxiety: Maladaptive personality traits, parenting behaviors, children's clinical outcomes, and scale psychometrics | No quantitative emotional/behavioural offspring outcomes (Study 1); no assessment of anxiety in fathers (Study 2); duplicate (Study 3); no quantitative emotional/behavioural offspring outcomes (Study 4) |
| Finsaas and Klein (2022)            | Is adult separation anxiety associated with offspring risk for internalizing psychiatric problems?                                                                     | Duplicate                                                                                                                                                                                                  |
| Firouzkouhi Moghaddam et al. (2012) | The comparison of behavioral and emotional problems in bipolar parent's children and children with healthy parent in Zahedan, Iran, 2011                               | No assessment of anxiety in fathers                                                                                                                                                                        |
| Fishbein (1984)                     | Expectant father's stress--due to the mother's expectations?                                                                                                           | No quantitative emotional/behavioural offspring outcomes                                                                                                                                                   |
| Fitzgerald and Lane (2000)          | The role of the father in anorexia                                                                                                                                     | Review/commentary papers and research protocols (no new data/findings)                                                                                                                                     |
| Fjermestad et al. (2020)            | Parental internalizing symptoms as predictors of anxiety symptoms in clinic-referred children                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder                                                                                                         |
| Fliek et al. (2019)                 | A longitudinal study on the relations among fear-enhancing parenting, cognitive biases, and anxiety symptoms in non-clinical children                                  | No assessment of anxiety in fathers                                                                                                                                                                        |
| Florez Lozano et al. (1985)         | Psychopathologic analysis of the alcoholic parent's child                                                                                                              | No assessment of anxiety in fathers                                                                                                                                                                        |
| Flouri and Buchanan (2003)          | The role of father involvement in children's later mental health                                                                                                       | No assessment of anxiety in fathers                                                                                                                                                                        |
| Flouri et al. (2019)                | Paternal Psychological Distress and Child Problem Behavior From Early Childhood to Middle Adolescence                                                                  | No assessment of anxiety in fathers                                                                                                                                                                        |
| Folayan et al. (2004)               | Dental anxiety in a subpopulation of African children: parents ability to predict and its relation to general anxiety and behaviour in the dental chair                | No assessment of anxiety in fathers                                                                                                                                                                        |
| Foley et al. (2004)                 | Informant disagreement for separation anxiety disorder                                                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder                                                                                                         |
| Foley et al. (2005)                 | Making sense of informant disagreement for overanxious disorder                                                                                                        | No quantitative emotional/behavioural offspring outcomes                                                                                                                                                   |

## Appendix C

| Author (year)                | Title                                                                                                                                                                                 | Reasons for exclusion                                                                              |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Fonseca et al. (2012)        | Parental psychological distress and quality of life after a prenatal or postnatal diagnosis of congenital anomaly: A controlled comparison study with parents of healthy infants      | No quantitative emotional/behavioural offspring outcomes                                           |
| Forbes et al. (2012)         | Real-world affect and social context as predictors of treatment response in child and adolescent depression and anxiety: An ecological momentary assessment study                     | No assessment of anxiety in fathers                                                                |
| Fosco (2009)                 | Beyond the parent-child dyad: Testing family systems influences on children's emotion regulation                                                                                      | No assessment of anxiety in fathers                                                                |
| Fossion et al. (2015)        | Transgenerational transmission of trauma in families of Holocaust survivors: The consequences of extreme family functioning on resilience, Sense of Coherence, anxiety and depression | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Foster et al. (2015)         | Intergenerational pathways leading to foster care placement of foster care alumni's children                                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Francis (2006)               | A psychometric evaluation of the parental behaviors and beliefs about Anxiety Questionnaire among a child clinical population                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Friedman et al. (2015)       | 1q21 microduplications in two pediatric patients with neurodevelopmental disorders                                                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Frisch-Volkert et al. (2020) | Different forms of biological fatherhood and their association with symptoms of psychopathology                                                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| Fry and Trifiletti (1983)    | Teenage fathers: An exploration of their developmental needs and anxieties and the implications for clinical-social intervention and services                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Gadow et al. (2010)          | Parent-child DRD4 genotype as a potential biomarker for oppositional, anxiety, and repetitive behaviors in children with autism spectrum disorder                                     | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Gander et al. (2019)         | A demographic look at adverse childhood experiences in behavioural referrals to consultant pediatrics                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Ganguli et al. (2021)        | Association between parent work-family conflict and offspring inflammation                                                                                                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Ganiban et al. (2010)        | Interparental conflict moderates genetic and environmental contributions to negative emotionality                                                                                     | No assessment of anxiety in fathers                                                                |
| Garcia et al. (2019)         | Genetic associations of serotonergic and GABAergic genes in an extended collection of early-onset obsessive-compulsive disorder trios                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Gaumon and Paquette (2013)   | The father-child activation relationship and internalising disorders at preschool age                                                                                                 | No assessment of anxiety in fathers                                                                |
| Gauthier (1993)              | Towards renewed fears of population and family decline?                                                                                                                               | Review/commentary papers and research protocols (no new data/findings)                             |
| Gelfand et al. (2019)        | The Association Between Parental Migraine and Infant Colic: A Cross-Sectional, Web-Based, U.S. Survey Study                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Gere et al. (2013)           | Fathers' mental health as a protective factor in the relationship between maternal and child depressive symptoms                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Gewirtz et al. (2018)        | Testing a Military Family Stress Model                                                                                                                                                | No assessment of anxiety in fathers                                                                |
| Ghanizadeh (2008)            | Association of nail biting and psychiatric disorders in children and their parents in a psychiatrically referred sample of children                                                   | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |

## Appendix C

| Author (year)                            | Title                                                                                                                                                                | Reasons for exclusion                                                                              |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Gieteling et al. (2012)                  | Functional abdominal pain in children and psychological problems                                                                                                     | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Gilder et al. (2002)                     | Psychiatric diagnoses among Mission Indian children with and without a parental history of alcohol dependence                                                        | No assessment of anxiety in fathers                                                                |
| Giunta and Compas (1994)                 | Adult daughters of alcoholics: Are they unique?                                                                                                                      | No assessment of anxiety in fathers                                                                |
| Glover et al. (2013)                     | Effects of prenatal anxiety, depression and stress on fetal and child development. Mechanisms and questions                                                          | Review/commentary papers and research protocols (no new data/findings)                             |
| Gnaulati (1996)                          | The influence of paternal bonding on levels of separation-individuation and ego-ideal development in late adolescence                                                | No assessment of anxiety in fathers                                                                |
| Godress et al. (2005)                    | Grief experiences of parents whose children suffer from mental illness                                                                                               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Goldstein (2006)                         | The relationship between parental psychopathology and children's subtypes of disruptive behavior problems                                                            | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Gonzalez-Forteza and Andrae Palos (1995) | The adolescent relationship with their parents and their sources of support: Correlation with depressive symptomatology and suicidal ideation in Mexican adolescents | No assessment of anxiety in fathers                                                                |
| Goodwin and Styron (2012)                | Perceived quality of early paternal relationships and mental health in adulthood                                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Gracia et al. (2005)                     | Parental rejection and psychosocial adjustment of children                                                                                                           | No assessment of anxiety in fathers                                                                |
| Grant et al. (2014)                      | Familial and individual predictors of alcohol and cigarette initiation in African-American and non-African-American youth from a high-risk study                     | No assessment of anxiety in fathers                                                                |
| Greco and Morris (2002)                  | Paternal child-rearing style and child social anxiety: Investigation of child perceptions and actual father behavior                                                 | No assessment of anxiety in fathers                                                                |
| Green and Kolevzon (1986)                | The correlates of healthy family functioning: The role of consensus and conflict in the practice of family therapy                                                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Grigoropoulos and Tekelidou (2021)       | Consequences of the parental emotional burden during the covid-19 pandemic                                                                                           | No assessment of anxiety in fathers                                                                |
| Grossmann et al. (2002)                  | The uniqueness of the child-father attachment relationship: Fathers' sensitive and challenging play as a pivotal variable in a 16-year longitudinal study            | No assessment of anxiety in fathers                                                                |
| Guada (2010)                             | Outcomes for teen parents: A within and cross case analysis                                                                                                          | No assessment of anxiety in fathers                                                                |
| Gubareva et al. (2012)                   | Influence of paternal deprivation on the psychosomatic development of the children                                                                                   | No assessment of anxiety in fathers                                                                |
| Gulay (2011)                             | Assessment of the prosocial behaviors of young children with regard to social development, social skills, parental acceptance-rejection and peer relationships       | No assessment of anxiety in fathers                                                                |
| Gunalan et al. (2012)                    | Migraine and non-migraine headaches in children and adolescents: A twin family case-control study of genetic influence, pain and psychological associations          | No assessment of anxiety in fathers                                                                |
| Gunay and Polat (2014)                   | The effect of family centred care on the anxiety levels of children with cancer and parents                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Gustavson et al. (2021)                  | Genetic and environmental contributions to co-occurring ADHD and emotional problems in school-aged children                                                          | No assessment of anxiety in fathers                                                                |

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| Author (year)                                                                                                                             | Title                                                                                                                                                   | Reasons for exclusion                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Guxens et al. (2013)                                                                                                                      | Parental psychological distress during pregnancy and early growth in preschool children: The generation R study                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Guxens et al. (2014)                                                                                                                      | Parental psychological distress during pregnancy and wheezing in preschool children: The Generation R Study                                             | No quantitative emotional/behavioural offspring outcomes                                           |
| Hadley (2008) - Parental symptoms of common mental disorders and children's social, motor, and language development in sub-Saharan Africa | Parental symptoms of common mental disorders and children's social, motor, and language development in sub-Saharan Africa                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Hagekull and Bohlin (2003)                                                                                                                | Early temperament and attachment as predictors of the Five Factor Model of personality                                                                  | No assessment of anxiety in fathers                                                                |
| Haghighi et al. (1999)                                                                                                                    | Parent-of-origin effect in panic disorder                                                                                                               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Hahlweg and Schulz (2020)                                                                                                                 | Prediction of bullying and victimization: Results of a 10-year follow-up study based on data from mothers, fathers, and adolescents                     | No assessment of anxiety in fathers                                                                |
| Hakim Shooshtary et al. (2008)                                                                                                            | Emotional and behavioral problems of single parent vs. Two parent children: Imam Khomeini charity                                                       | No assessment of anxiety in fathers                                                                |
| Hall (2007)                                                                                                                               | Posttraumatic stress symptoms in parents of children with injuries                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Hannigan et al. (2021)                                                                                                                    | Genetic Liability for Schizophrenia and Childhood Psychopathology in the General Population                                                             | No assessment of anxiety in fathers                                                                |
| Hanson et al. (1992)                                                                                                                      | The relationship between self-reported levels of distress of parents and victims in incest families                                                     | No assessment of anxiety in fathers                                                                |
| Harris et al. (2020)                                                                                                                      | Factors associated with decisions around feminizing genitoplasty in patients with differences/disorders of sex development                              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Harvey et al. (2011)                                                                                                                      | Psychopathology and Parenting Practices of Parents of Preschool Children with Behavior Problems                                                         | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Harwas-Napierala (1987)                                                                                                                   | Socio-family factors in the formation of timidity in young children                                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Hassan (1977)                                                                                                                             | Child-rearing attitudes and some personality traits of the parents of prejudiced school children                                                        | No quantitative emotional/behavioural offspring outcomes                                           |
| Hassan et al. (1977)                                                                                                                      | A study of anxiety in school children as related to child-rearing attitude and some personality traits of parents                                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Haugen (2007)                                                                                                                             | Maternal psychiatric disturbance at eight weeks postpartum and its relation to personal, child, and family functioning at two to three years postpartum | No assessment of anxiety in fathers                                                                |
| Hautmann et al. (2015)                                                                                                                    | Association between parental emotional symptoms and child antisocial behaviour: What is specific and is it mediated by parenting?                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Haverman et al. (2013)                                                                                                                    | The use of electronic patient and parent reported outcomes in a follow-up after a PICU admission                                                        | No assessment of anxiety in fathers                                                                |
| Havinga et al. (2018)                                                                                                                     | Paternal and maternal depression and offspring risk: additive effects or worse?                                                                         | Review/commentary papers and research protocols (no new data/findings)                             |
| Hay (2005)                                                                                                                                | The experience of worry in relationships between adults and their parents                                                                               | No assessment of anxiety in fathers                                                                |
| Hay et al. (2007)                                                                                                                         | The experience of worry in parent-adult child relationships                                                                                             | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                    | Title                                                                                                                                                                                   | Reasons for exclusion                                                                              |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Hayden and Klein (2001)          | Outcome of dysthymic disorder at 5-year follow-up: the effect of familial psychopathology, early adversity, personality, comorbidity, and chronic stress                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Hazeltine (1995)                 | Narcissistic traits in the parent related to the child's motivational style                                                                                                             | No assessment of anxiety in fathers                                                                |
| He et al. (2020)                 | The association between parental meta philosophy and adolescent's behavior problem: The moderating role of vagus                                                                        | No assessment of anxiety in fathers                                                                |
| Heather et al. (2010)            | "What were we thinking!" An innovative psycho-educational program to prevent common postpartum mental disorders in women                                                                | No quantitative emotional/behavioural offspring outcomes                                           |
| Heaton (2010)                    | Contributions of neglect subtypes and family history in DSM-IV disorders: Findings from the NCS-R                                                                                       | No assessment of anxiety in fathers                                                                |
| Hecker et al. (2021)             | Factors Contributing to Violence Against Children: Insights From a Multi-informant Study Among Family-Triads From Three East-African Refugee Camps                                      | No assessment of anxiety in fathers                                                                |
| Hedtke (2007)                    | Safety-seeking and coping behavior during exposure tasks when treating anxious youth                                                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Helenius et al. (2014)           | Family load estimates and risk factors of anxiety disorders in a nationwide three generation study                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Henderson (2010)                 | Study of perceived parenting traits and how they may contribute to the development of antisocial, negativistic, paranoid and schizotypal personality disorders based on Millon's theory | No assessment of anxiety in fathers                                                                |
| Herman and McHale (1993)         | Coping with parental negativity: Links with parental warmth and child adjustment                                                                                                        | No assessment of anxiety in fathers                                                                |
| Herman-Stahl et al. (2008)       | Moderation and Mediation in the Relationship Between Mothers' or Fathers' Serious Psychological Distress and Adolescent Substance Use: Findings from a National Sample                  | No assessment of anxiety in fathers                                                                |
| Hernandez-Martinez et al. (2011) | Parents' perceptions of their neonates and their relation to infant development                                                                                                         | No assessment of anxiety in fathers                                                                |
| Herve et al. (2009)              | Predictors of outcome in infant and toddlers functional or behavioral disorders after a brief parent-infant psychotherapy                                                               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Herve et al. (2013)              | Infants and toddlers behavioral and functional disorders: Characteristics, mother-child interactions, alliance and outcome after a brief parents-child psychotherapy. A pilot study     | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Heuckendorff et al. (2022)       | Parental mental health, socioeconomic position and the risk of asthma in children-a nationwide Danish register study                                                                    | No assessment of anxiety in fathers                                                                |
| Hibbs et al. (1991)              | Determinants of expressed emotion in families of disturbed and normal children                                                                                                          | No quantitative emotional/behavioural offspring outcomes                                           |
| Hicks et al. (2009)              | Gene-environment interplay in internalizing disorders: Consistent findings across six environmental risk factors                                                                        | No assessment of anxiety in fathers                                                                |
| Hill (1982)                      | Psychotherapy with high-achieving adolescent girls                                                                                                                                      | Review/commentary papers and research protocols (no new data/findings)                             |
| Hock et al. (2001)               | Separation anxiety in parents of adolescents: theoretical significance and scale development                                                                                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Holditch-Davis and Miles (2016)  | Understanding and treating the psychosocial consequences of pregnancy complications and the birth of a high-risk infant                                                                 | Review/commentary papers and research protocols (no new data/findings)                             |

## Appendix C

| Author (year)                  | Title                                                                                                                                                       | Reasons for exclusion                                                                              |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Holst et al. (2019)            | Parental alcohol use disorder with and without other mental disorders and offspring alcohol use disorder                                                    | No assessment of anxiety in fathers                                                                |
| Hong (2022)                    | A cross-cultural perspective on overparenting and emerging adults' well-being                                                                               | No assessment of anxiety in fathers                                                                |
| Hoover (2001)                  | Teachers' ratings of children's behavior problems: A method for potentially adjusting for rater effects                                                     | No assessment of anxiety in fathers                                                                |
| Hope (2021)                    | Is love enough? The consequences of family economic disadvantage and parent-child relationships for adolescent children's well-being                        | No assessment of anxiety in fathers                                                                |
| Horwitz (1983)                 | Changing concepts of health and health services: new opportunities for nutrition promotion                                                                  | Review/commentary papers and research protocols (no new data/findings)                             |
| Hossain (2013)                 | Fathers' and mothers' perceptions of their children's psychosocial behaviors in Mexican immigrant families                                                  | Review/commentary papers and research protocols (no new data/findings)                             |
| Hourigan et al. (2010)         | Combining a pediatric psychology practicum placement and anxiety and depression screening measures: Improving psychosocial care for patients and caregivers | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Hruska et al. (2021)           | Associations between family-based stress and dietary inflammatory potential among families with preschool-aged children                                     | No assessment of anxiety in fathers                                                                |
| Huang and An (2015)            | Parental patterns, childhood abuse, attachment and personality disorders                                                                                    | No assessment of anxiety in fathers                                                                |
| Hudson et al. (2008)           | Parental responses to positive and negative emotions in anxious and nonanxious children                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Hudson et al. (2014)           | The Impact of Brief Parental Anxiety Management on Child Anxiety Treatment Outcomes: A Controlled Trial                                                     | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Hulgaard et al. (2021)         | Health anxiety symptoms in Danish children during the first lockdown period of the COVID-19 pandemic: an Odense Child Cohort study                          | Duplicate                                                                                          |
| Humenick and Bugen (1981)      | Correlates of parent-infant interaction: An exploratory study                                                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Hummel (2000)                  | Parental correlates of socially anxious children: An observational study                                                                                    | No assessment of anxiety in fathers                                                                |
| Hussain (1972)                 | Prevalence of psychological disorders among children in rural population                                                                                    | No assessment of anxiety in fathers                                                                |
| Iannattone et al. (2021)       | Children with psychopathology and their parents facing the covid-19 pandemic: a case-control study                                                          | No quantitative emotional/behavioural offspring outcomes                                           |
| Ierardi et al. (2019)          | Maternal and paternal depression and anxiety: their relationship with mother-infant interactions at 3months                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| Igumnov and Drozdovitch (2000) | The intellectual development, mental and behavioural disorders in children from Belarus exposed in utero following the Chernobyl accident                   | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Infrasca (2009)                | Parental style and suicidal ideation in psychiatric patients                                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Ismail et al. (2015)           | The prevalence and risk factors of anxiety disorders in an Egyptian sample of school and students at the age of 12-18 years                                 | No assessment of anxiety in fathers                                                                |
| Isnard et al. (2010)           | Bulimic behaviours and psychopathology in obese adolescents and in their parents                                                                            | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |

## Appendix C

| Author (year)                     | Title                                                                                                                                                                                            | Reasons for exclusion                                                                              |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Israeli (1997)                    | Mother, fathers, daughters, and sons: The effect of parents' and children's gender on parental experiences of their toddler's separation-individuation                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Jackson (1964)                    | Anxiety in adolescents in relation to school refusal                                                                                                                                             | No quantitative emotional/behavioural offspring outcomes                                           |
| Jacobs et al. (2013)              | The impact of paternal and maternal depression on internalizing and externalizing disorders among offspring                                                                                      | No assessment of anxiety in fathers                                                                |
| Jacobs et al. (2015)              | The influence of paternal and maternal major depressive disorder on offspring psychiatric disorders                                                                                              | No assessment of anxiety in fathers                                                                |
| Jacobvitz et al. (2004)           | Observations of early triadic family interactions: boundary disturbances in the family predict symptoms of depression, anxiety, and attention-deficit/hyperactivity disorder in middle childhood | No assessment of anxiety in fathers                                                                |
| Jakupcevic and Ajdukovic (2011)   | Risk factors of child physical abuse by parents with mixed anxiety-depressive disorder or posttraumatic stress disorder                                                                          | No quantitative emotional/behavioural offspring outcomes                                           |
| Jami et al. (2020)                | Maternal and paternal effects on offspring internalizing problems: Results from genetic and family-based analyses                                                                                | No quantitative emotional/behavioural offspring outcomes                                           |
| Jelenova et al. (2015)            | Quality of life in adolescents with inflammatory bowel disease and their parents - Comparison with healthy controls                                                                              | No assessment of anxiety in fathers                                                                |
| Jensen et al. (1989)              | Father absence: Effects on child and maternal psychopathology                                                                                                                                    | No assessment of anxiety in fathers                                                                |
| Jeppesen et al. (2014)            | Does a parental history of cancer moderate the associations between impaired health status in parents and psychosocial problems in teenagers: a HUNT study                                       | No assessment of anxiety in fathers                                                                |
| Jeramaz (1999)                    | Older fathers and adult children: A study of attachment style, ego integrity, and relationship quality in late life                                                                              | No assessment of anxiety in fathers                                                                |
| Ji et al. (2005)                  | Difference of self-consciousness in children and juveniles between urban and rural areas and the association with the educational background of their parents                                    | No assessment of anxiety in fathers                                                                |
| Joelsson et al. (2017)            | Parental psychopathology and offspring attention-deficit/hyperactivity disorder in a nationwide sample                                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Johns et al. (2021)               | Behavioral Adjustment of Preschool Children With and Without Craniofacial Microsomia                                                                                                             | No assessment of anxiety in fathers                                                                |
| Johnson (2016)                    | A twin study examining the development of rumination and its role as a transdiagnostic risk factor for psychopathology                                                                           | No assessment of anxiety in fathers                                                                |
| Johnson et al. (2004)             | Paternal psychiatric symptoms and maladaptive paternal behavior in the home during the child rearing years                                                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| Jones and Cassidy (2014)          | Parental attachment style: examination of links with parent secure base provision and adolescent secure base use                                                                                 | No assessment of anxiety in fathers                                                                |
| Jones and Cassidy (2014)          | "Parental attachment style: Examination of links with parent secure base provision and adolescent secure base use": Erratum                                                                      | Duplicate                                                                                          |
| Jongerden et al. (2015)           | Factors associated with the referral of anxious children to mental health care: the influence of family functioning, parenting, parental anxiety and child impairment                            | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Joseph (2021)                     | 9.2 parent and infant factors associated with early parenting distress among families with ADHD                                                                                                  | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Joseph and Chronis-Tuscano (2021) | Parental ADHD and their offspring from the perinatal period to early childhood                                                                                                                   | Review/commentary papers and research protocols (no new data/findings)                             |
| Josko et al. (2012)               | Family factors modifying the eating disorders of young people in Poland                                                                                                                          | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)               | Title                                                                                                                                                                      | Reasons for exclusion                                                                              |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Julian et al. (1991)        | Mediators of relationship stress between middle-aged fathers and their adolescent children                                                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| Jung et al. (2016)          | Association of respondent psychiatric comorbidity with family history of comorbidity: Results from the National Epidemiologic Survey on Alcohol and Related Conditions-III | No assessment of anxiety in fathers                                                                |
| Juric (2009)                | The connection between adult partner attachment and parenting styles                                                                                                       | No assessment of anxiety in fathers                                                                |
| Kaasboll et al. (2014)      | Substance use in children of parents with chronic pain - the HUNT study                                                                                                    | No assessment of anxiety in fathers                                                                |
| Kahn et al. (2004)          | Combined effect of mothers' and fathers' mental health symptoms on children's behavioral and emotional well-being                                                          | No assessment of anxiety in fathers                                                                |
| Kalogiros (2007)            | How do family functioning and age of onset of weight problems relate to overweight adolescents' internalizing symptoms?                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Karaatmaca et al. (2021)    | The impact of skin prick testing on pain perception and anxiety in children and parents                                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Karacetin et al. (2018)     | Prevalence of Childhood Affective disorders in Turkey: An epidemiological study                                                                                            | No assessment of anxiety in fathers                                                                |
| Karimi et al. (2012)        | The effect of educational and psychological factors on academic achievements of the secondary school students in Esfahan                                                   | No assessment of anxiety in fathers                                                                |
| Karlsson (2011)             | Prenatal psychiatry: Findings from three birth cohorts                                                                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Karreman et al. (2010)      | Relations among temperament, parenting and problem behavior in young children                                                                                              | No assessment of anxiety in fathers                                                                |
| Karson and Markenson (1973) | Some relations between parental personality factors and childhood symptomatology                                                                                           | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kashdan et al. (2004)       | Depression and Anxiety in Parents of Children With ADHD and Varying Levels of Oppositional Defiant Behaviors: Modeling Relationships With Family Functioning               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kashefi et al. (2012)       | The PTSD altruists' effects on the psychological health of young children                                                                                                  | No assessment of anxiety in fathers                                                                |
| Kasparian et al. (2020)     | Early life experiences of infants with heart disease and their parents: Psychobiological pathways of influence and for intervention                                        | No quantitative emotional/behavioural offspring outcomes                                           |
| Kato et al. (2002)          | The impact of paternal involvement and maternal childcare anxiety on sociability of three-year-olds: Two cohort comparisons                                                | No assessment of anxiety in fathers                                                                |
| Kavanagh and Sanders (2020) | Does an online wellbeing program (Baby Steps) prevent perinatal distress in first-time fathers and mothers?                                                                | No quantitative emotional/behavioural offspring outcomes                                           |
| Keller et al. (2009)        | Marital Conflict in the Context of Parental Depressive Symptoms: Implications for the Development of Children's Adjustment Problems                                        | No assessment of anxiety in fathers                                                                |
| Keller et al. (2012)        | Parental problem drinking, marital conflict, and child sleep                                                                                                               | No assessment of anxiety in fathers                                                                |
| Kelley et al. (2017)        | Behavioral couples treatment for substance use disorder: Secondary effects on the reduction of youth internalizing symptoms                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kelley et al. (2018)        | Mental Health Symptoms and Parenting Among Father-Only and Dual Substance Use Disorder Couples                                                                             | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |

## Appendix C

| Author (year)              | Title                                                                                                                                       | Reasons for exclusion                                                                              |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Kelley et al. (2019)       | "Behavioral couples treatment for substance use disorder: Secondary effects on the reduction of youth internalizing symptoms": Correction   | Duplicate                                                                                          |
| Kendall et al. (2009)      | In-Session Exposure Tasks and Therapeutic Alliance Across the Treatment of Childhood Anxiety Disorders                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kendler et al. (1997)      | The familial aggregation of common psychiatric and substance use disorders in the National Comorbidity survey: A family history study       | No assessment of anxiety in fathers                                                                |
| Keren (2011)               | Family functioning in the context of infant psychopathology                                                                                 | No assessment of anxiety in fathers                                                                |
| Kersh (2007)               | Understanding the relationship between siblings when one child has a developmental disability                                               | No assessment of anxiety in fathers                                                                |
| Kervinen and Aunola (2013) | The role of parenting styles on children's achievement strategies and their development during the first grade                              | No assessment of anxiety in fathers                                                                |
| Khalil et al. (2020)       | Recruiting Immigrant and Refugee Arab American Mother-Father-Infant Triads Resettling in the United States: A Feasibility Study             | No assessment of anxiety in fathers                                                                |
| Khasakhala et al. (2013)   | Suicidal behaviour among youths associated with psychopathology in both parents and youths attending outpatient psychiatric clinic in Kenya | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kikkawa et al. (1994)      | The relationships between parents and their childrens personalities                                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Kikkert et al. (2010)      | Maternal anxiety is related to infant neurological condition, paternal anxiety is not                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| Kilic et al. (2003)        | The psychological effects of parental mental health on children experiencing disaster: the experience of Bolu earthquake in Turkey          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kilic et al. (2011)        | Effect of relocation and parental psychopathology on earthquake survivor-children's mental health                                           | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kim et al. (2010)          | Impact and characteristics of positive and fearful emotional messages during infant social referencing                                      | No assessment of anxiety in fathers                                                                |
| Klaus (2006)               | A psychometric evaluation of two measures of expressed emotion in caregivers of children with mood disorders                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Klein and Nimorwicz (1982) | The relationship between psychological distress and knowledge of disease among hemophilia patients and their families: A pilot study        | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Klonsky et al. (1990)      | Developmental antecedents of private self-consciousness, public self-consciousness and social anxiety                                       | No assessment of anxiety in fathers                                                                |
| Klonsky et al. (1991)      | "Developmental antecedents of private self-consciousness, public self-consciousness and social anxiety": Correction                         | Duplicate                                                                                          |
| Knappe et al. (2012)       | Characterizing the association between parenting and adolescent social phobia                                                               | No assessment of anxiety in fathers                                                                |
| Kochanska and Kim (2013)   | Early Attachment Organization With Both Parents and Future Behavior Problems: From Infancy to Middle Childhood                              | No assessment of anxiety in fathers                                                                |
| Kochanska et al. (2004)    | Parents' Personality and Infants' Temperament as Contributors to Their Emerging Relationship                                                | No assessment of anxiety in fathers                                                                |
| Kochanska et al. (2007)    | Children's fearfulness as a moderator of parenting in early socialization: Two longitudinal studies                                         | No assessment of anxiety in fathers                                                                |
| Kohlmann et al. (1988)     | Trait anxiety and parental child-rearing behavior: Support as a moderator variable?                                                         | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                 | Title                                                                                                                                                                    | Reasons for exclusion                                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Komurcu and Pekak (2017)      | The relationship between early maladaptive schemas, parenting styles and psychological symptoms and the needs threats                                                    | No assessment of anxiety in fathers                                                                |
| Korja et al. (2011)           | Effects of parents' prenatal attachment, marital satisfaction and parent's anxiety on the quality of triadic interaction with 18 months old child                        | No quantitative emotional/behavioural offspring outcomes                                           |
| Korja et al. (2015)           | Parents' psychological well-being and parental self-efficacy in relation to the family's triadic interaction                                                             | No quantitative emotional/behavioural offspring outcomes                                           |
| Kovacs et al. (2013)          | Functioning of families with primary school-age children conceived using anonymous donor sperm                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Krain and Kendall (2000)      | The role of parental emotional distress in parent report of child anxiety                                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kreiter (2020)                | Emotion regulation in adolescent anorexia nervosa: A contextual view                                                                                                     | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Krohne (1990)                 | Parental childrearing and anxiety development                                                                                                                            | Review/commentary papers and research protocols (no new data/findings)                             |
| Kubb and Foran (2020)         | Measuring COVID-19 related anxiety in parents: Psychometric comparison of four different inventories                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Kujawa (2016)                 | Early temperament and parental psychopathology as predictors of neural reactivity to reward in middle childhood                                                          | No assessment of anxiety in fathers                                                                |
| Kullberg et al. (2021)        | Why some siblings thrive whereas others struggle: A within-family study on recollections of childhood parental bonding and current adult depressive and anxiety symptoms | No assessment of anxiety in fathers                                                                |
| Kurtz and Davidson (1974)     | Psychic trauma in an Israeli child: relationship to environmental security                                                                                               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Kushnir (1984)                | Parental anxiety and children's attendance at emergency departments in relation to the child's birth order                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Kvalevaag et al. (2013)       | Paternal mental health and socioemotional and behavioral development in their children                                                                                   | No assessment of anxiety in fathers                                                                |
| Kvalevaag et al. (2014)       | Does paternal mental health in pregnancy predict physically aggressive behavior in children?                                                                             | No assessment of anxiety in fathers                                                                |
| Kwan (2022)                   | Negative/intrusive parenting as a predictor of internalizing symptoms in preschool-aged children living in rural areas of high poverty                                   | No assessment of anxiety in fathers                                                                |
| Laifer et al. (2021)          | Prenatal negative affectivity and trauma-related distress predict mindful parenting during toddler age: Examining parent-infant bonding as a mechanism                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Landman-Peeters et al. (2005) | Gender differences in the relation between social support, problems in parent-offspring communication, and depression and anxiety                                        | No assessment of anxiety in fathers                                                                |
| Landman-Peeters et al. (2008) | Risk of emotional disorder in offspring of depressed parents: Gender differences in the effect of a second emotionally affected parent                                   | No assessment of anxiety in fathers                                                                |
| Lange et al. (2005)           | Family factors associated with attention deficit hyperactivity disorder and emotional disorders in children                                                              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Lange et al. (2011)           | Parental psychosocial stress and asthma morbidity in Puerto Rican twins                                                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Langley et al. (2003)         | A pilot study to quantify parental anxiety associated with enrollment of an infant or toddler in a phase III vaccine trial                                               | No quantitative emotional/behavioural offspring outcomes                                           |

## Appendix C

| Author (year)                 | Title                                                                                                                                                                          | Reasons for exclusion                                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Lara et al. (2009)            | Childhood predictors of adult attention-deficit/hyperactivity disorder: results from the World Health Organization World Mental Health Survey Initiative                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Last and Klein (1984)         | Impact of parental holocaust traumatization on offsprings' reports of parental child-rearing practices                                                                         | No assessment of anxiety in fathers                                                                |
| Lavori et al. (1988)          | Affective disorder in childhood: Separating the familial component of risk from individual characteristics of children                                                         | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Lawrence et al. (2019)        | A longitudinal study of parental discipline up to 5 years                                                                                                                      | Duplicate                                                                                          |
| Lawrenz et al. (2021)         | Act raising safe kids program improves parenting practices, beliefs about physical punishment, management of anger, and mental health: Initial evidence from a study in Brazil | No quantitative emotional/behavioural offspring outcomes                                           |
| Lazarus et al. (2016)         | The relationship between challenging parenting behaviour and childhood anxiety disorders                                                                                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Lee et al. (2012)             | Growing pains: A twin family case-control study of genetic influence, pain and psychological associations                                                                      | No assessment of anxiety in fathers                                                                |
| Legerstee et al. (2008)       | Maternal anxiety predicts favourable treatment outcomes in anxiety-disordered adolescents                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Leibman (1998)                | Familial predictors of depressed mood in adolescence                                                                                                                           | No assessment of anxiety in fathers                                                                |
| Leinonen et al. (2002)        | The specific mediating paths between economic hardship and the quality of parenting                                                                                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Lemery-Chalfant et al. (2007) | Assessing internalizing, externalizing, and attention problems in young children: Validation of the MacArthur HBQ                                                              | No assessment of anxiety in fathers                                                                |
| Lemery-Chalfant et al. (2011) | Quadratic COMT x Sex predicts anxiety and depression in middle childhood                                                                                                       | No assessment of anxiety in fathers                                                                |
| Lempp (1968)                  | [Inaccessible father. The role of the father in the etiology of neuroses in boys and male adolescents]                                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Lenane et al. (1990)          | Psychiatric disorders in first degree relatives of children and adolescents with obsessive compulsive disorder                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Lennertz et al. (2010)        | Perceived parental rearing in subjects with obsessive-compulsive disorder and their siblings                                                                                   | No assessment of anxiety in fathers                                                                |
| Leon and Leon (1990)          | Panic disorder and parental bonding                                                                                                                                            | No assessment of anxiety in fathers                                                                |
| Letamendi (2012)              | A family study of PTSD: Occurrence and correlates of internalizing disorders in children of OIF/OEF soldiers with combat posttraumatic stress disorder                         | No assessment of anxiety in fathers                                                                |
| Letcher et al. (2020)         | Adolescent and young adult mental health problems and infant offspring behavior: Findings from a prospective intergenerational cohort study                                    | No assessment of anxiety in fathers                                                                |
| Letourneau et al. (2009)      | The role of paternal support in the behavioural development of children exposed to postpartum depression                                                                       | No assessment of anxiety in fathers                                                                |
| Letourneau et al. (2019)      | Maternal and paternal perinatal depressive symptoms associate with 2-and 3-year-old children's behaviour: Findings from the APrON longitudinal study                           | No assessment of anxiety in fathers                                                                |
| Letourneau et al. (2022)      | The Alberta Pregnancy Outcomes and Nutrition (APrON) longitudinal study: Cohort profile and key findings from the first three years                                            | No assessment of anxiety in fathers                                                                |
| Leung (2021)                  | Overparenting, Parent-Child Conflict and Anxiety among Chinese Adolescents: A Cross-Lagged Panel Study                                                                         | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)            | Title                                                                                                                                                                    | Reasons for exclusion                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Lew-Starowicz (1988)     | [Cyclic impotence in male infertility]                                                                                                                                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Lewis et al. (2011)      | Investigating environmental links between parent depression and child depressive/anxiety symptoms using an assisted conception design                                    | No assessment of anxiety in fathers                                                                |
| Li et al. (2008)         | Age-specific familial risks of anxiety: A nation-wide epidemiological study from Sweden                                                                                  | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Li et al. (2021)         | Combined effects of mother's, father's and teacher's psychological distress on schoolchildren's mental health symptoms                                                   | No assessment of anxiety in fathers                                                                |
| Li et al. (2022)         | Relationship between paternal adult attachment and adolescent anxiety: The chain-mediating effect of paternal psychological flexibility and father-adolescent attachment | No assessment of anxiety in fathers                                                                |
| Li et al. (2022)         | Relationship between paternal adult attachment and adolescent anxiety: The chain-mediating effect of paternal psychological flexibility and father-adolescent attachment | Duplicate                                                                                          |
| Liang et al. (2019)      | Traumatic experiences and posttraumatic stress disorder among Chinese rural-to-urban migrant children                                                                    | No assessment of anxiety in fathers                                                                |
| Liber et al. (2008)      | Parenting and Parental Anxiety and Depression as Predictors of Treatment Outcome for Childhood Anxiety Disorders: Has the Role of Fathers Been Underestimated?           | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Liebman (1998)           | Familial predictors of depressed mood in adolescence                                                                                                                     | No assessment of anxiety in fathers                                                                |
| Ligezka et al. (2020)    | 20.1 an evaluation of parental depressive symptoms, stress, and parenting styles during an infant immunization visit                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Lincoln (1984)           | Fathering and the separation-individuation process                                                                                                                       | Review/commentary papers and research protocols (no new data/findings)                             |
| Liu et al. (2021)        | Parental Harsh Discipline and Migrant Children's Anxiety in China: The Moderating Role of Parental Warmth and Gender                                                     | No assessment of anxiety in fathers                                                                |
| Livesey (1997)           | Predictors of parent and child behaviors during daily separations and reunions at daycare                                                                                | No assessment of anxiety in fathers                                                                |
| Lizardi (1999)           | The role of parental psychopathology and reports of the childhood home environment in major depression, and dysthymia                                                    | No assessment of anxiety in fathers                                                                |
| Lonnberg (2022)          | Mindfulness based childbirth and parenting program - supporting a good beginning                                                                                         | No assessment of anxiety in fathers                                                                |
| Lopez (1991)             | [A year of work with adolescents]                                                                                                                                        | Review/commentary papers and research protocols (no new data/findings)                             |
| Lovel and Bakoula (1985) | Lack of family planning leading to induced abortion in rural Greece                                                                                                      | No quantitative emotional/behavioural offspring outcomes                                           |
| Low et al. (2012)        | Maternal, but not paternal, mood/anxiety disorders are associated with psychiatric disorders in young adults                                                             | Duplicate                                                                                          |
| Low et al. (2013)        | The association between parental mood/anxiety disorders and psychiatric symptoms and disorders in young adult offspring                                                  | Duplicate                                                                                          |
| Lucassen et al. (2018)   | Paternal history of depression or anxiety disorder and infant-father attachment                                                                                          | No quantitative emotional/behavioural offspring outcomes                                           |
| Luedemann (2014)         | Examining parental psychopathology, parenting, and coparenting in families of children with attention-deficit/hyperactivity disorder                                     | No quantitative emotional/behavioural offspring outcomes                                           |

## Appendix C

| Author (year)                 | Title                                                                                                                                                                                                         | Reasons for exclusion                                                                              |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Lund et al. (2019)            | Association of Constellations of Parental Risk with Children's Subsequent Anxiety and Depression: Findings from a HUNT Survey and Health Registry Study                                                       | No assessment of anxiety in fathers                                                                |
| Luo et al. (2012)             | A control study on mental health of migrant children in Changsha                                                                                                                                              | No assessment of anxiety in fathers                                                                |
| Luoma et al. (2013)           | Fathers' postnatal depressive and anxiety symptoms: An exploration of links with paternal, maternal, infant and family factors                                                                                | No assessment of anxiety in fathers                                                                |
| Lupattelli et al. (2019)      | Risk of attention deficit hyperactivity disorder in childhood after exposure to serotonergic antidepressants in pregnancy                                                                                     | No assessment of anxiety in fathers                                                                |
| Lupattelli et al. (2021)      | Attention-deficit/hyperactivity disorder in children following prenatal exposure to antidepressants: results from the Norwegian mother, father and child cohort study                                         | No assessment of anxiety in fathers                                                                |
| Luthar et al. (1993)          | Parental psychopathology and disorders in offspring: A study of relatives of drug abusers                                                                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Ma (2011)                     | An exploratory study of the impact of an adolescent's eating disorder on Chinese parents' well-being, marital life and perceived family functioning in Shenzhen, China: Implications for social work practice | No quantitative emotional/behavioural offspring outcomes                                           |
| Ma et al. (2021)              | Children and Adolescents' Psychological Well-Being Became Worse in Heavily Hit Chinese Provinces during the COVID-19 Epidemic                                                                                 | No assessment of anxiety in fathers                                                                |
| Macdonald et al. (2020)       | From adolescence to parenthood: a multi-decade study of preconception mental health problems and postpartum parent-infant bonds                                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Macdonald et al. (2021)       | Cohort profile: The Men and Parenting Pathways (MAPP) Study: A longitudinal Australian cohort study of men's mental health and well-being at the normative age for first-time fatherhood                      | No quantitative emotional/behavioural offspring outcomes                                           |
| MacPherson et al. (2001)      | Parental problem drinking and anxiety disorder symptoms in adult offspring: examining the mediating role of anxiety sensitivity components                                                                    | No assessment of anxiety in fathers                                                                |
| Madsen et al. (2017)          | Parental psychiatric problems increase severity of ADHD symptoms and comorbidity in their children                                                                                                            | No assessment of anxiety in fathers                                                                |
| Maggi et al. (2008)           | Paternal psychosocial work conditions and mental health outcomes: A case-control study                                                                                                                        | No assessment of anxiety in fathers                                                                |
| Majdandzic et al. (2014)      | Fathers' challenging parenting behavior prevents social anxiety development in their 4-year-old children: A longitudinal observational study                                                                  | No assessment of anxiety in fathers                                                                |
| Makihara et al. (1985)        | An investigation of neurotic school refusal in one-parent families                                                                                                                                            | No assessment of anxiety in fathers                                                                |
| Maldonado-Duran et al. (2000) | Perinatal psychiatry: Infant mental health interventions during pregnancy                                                                                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Manicavasagar et al. (2001)   | Parent-child concordance for separation anxiety: A clinical study                                                                                                                                             | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Marceau et al. (2011)         | Do different types of perinatal risk differentially mediate associations between genetic risk for psychopathology and infant behavior?                                                                        | No assessment of anxiety in fathers                                                                |
| Marci et al. (2021)           | Problematic Internet Use in early adolescence: The role of attachment and negative beliefs about worry                                                                                                        | No assessment of anxiety in fathers                                                                |
| Margari et al. (2013)         | Parents psychopathology of children with Attention Deficit Hyperactivity Disorder                                                                                                                             | No quantitative emotional/behavioural offspring outcomes                                           |

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| Author (year)               | Title                                                                                                                                                                            | Reasons for exclusion                                                                              |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Martin et al. (1999)        | Anxiety and depressive disorders in fathers and mothers of anxious school-refusing children                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Martin et al. (2007)        | Adverse associations of infant and child sleep problems and parent health: An Australian population study                                                                        | No assessment of anxiety in fathers                                                                |
| Martin et al. (2013)        | Sequential analysis of mothers' and fathers' reassurance and children's postoperative distress                                                                                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Martin et al. (2017)        | Factors related to the comorbidity between oppositional defiant disorder and anxiety disorders in preschool children                                                             | No assessment of anxiety in fathers                                                                |
| Mascendaro et al. (2012)    | Parent discrepancies in ratings of young children's co-occurring internalizing symptoms                                                                                          | No assessment of anxiety in fathers                                                                |
| Mashoodh (2015)             | Paternal effects on offspring development: Epigenetic mechanisms and the role of paternal-maternal interplay                                                                     | No assessment of anxiety in fathers                                                                |
| Masi et al. (2003)          | Temperament in adolescents with anxiety and depressive disorders and in their families                                                                                           | No assessment of anxiety in fathers                                                                |
| Masiri et al. (2012)        | The role of self-control, quality of relationship with parents and school environment in the mental health and antisocial behavior of adolescents                                | No assessment of anxiety in fathers                                                                |
| Massoudi et al. (2011)      | Postnatal distress in fathers and mothers - Prevalence and correlates in a Swedish sample                                                                                        | No quantitative emotional/behavioural offspring outcomes                                           |
| Mastin (2004)               | Parental interactions with their anxious and non-anxious children: A test of the fear effect within families                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Mathew et al. (2020)        | Current practice of pre-anaesthesia preparation and perioperative parental satisfaction during paediatric ambulatory procedures in a developing country - An observational study | No quantitative emotional/behavioural offspring outcomes                                           |
| Matjasko and Feldman (2005) | Emotional transmission between parents and adolescents: The importance of work characteristics and relationship quality                                                          | Review/commentary papers and research protocols (no new data/findings)                             |
| Mattanah et al. (2004)      | Parental Attachment, Separation-Individuation, and College Student Adjustment: A Structural Equation Analysis of Mediation Effects                                               | No assessment of anxiety in fathers                                                                |
| Mayeux (2001)               | The role of the father in the development of stranger anxiety in infants: A longitudinal examination of infants with high- and low-interacting fathers                           | No assessment of anxiety in fathers                                                                |
| McAnally et al. (2021)      | Childhood disadvantage and adolescent socioemotional wellbeing as predictors of future parenting behaviour                                                                       | No assessment of anxiety in fathers                                                                |
| McConnell and Kerig (2002)  | Assessing coparenting in families of school-age children: validation of the coparenting and family rating system                                                                 | No assessment of anxiety in fathers                                                                |
| McCranie et al. (1992)      | Negative parenting behavior, combat exposure, and PTSD symptom severity. Test of a person-event interaction model                                                                | No assessment of anxiety in fathers                                                                |
| McCurdy (2022)              | Relations between parental autonomy support and child anxiety symptoms across elementary school in two-parent families                                                           | No assessment of anxiety in fathers                                                                |
| McKenry et al. (1982)       | Adolescent suicide: A comparison of attempters and nonattempters in an emergency room population                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| McShane and Hastings (2009) | The new friends vignettes: Measuring parental psychological control that confers risk for anxious adjustment in preschoolers                                                     | No assessment of anxiety in fathers                                                                |
| Mebert (1991)               | Dimensions of subjectivity in parents' ratings of infant temperament                                                                                                             | No quantitative emotional/behavioural offspring outcomes                                           |
| Meier et al. (2015)         | Diagnosed anxiety disorders and the risk of subsequent anorexia nervosa: A Danish population register study                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |

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| Author (year)                       | Title                                                                                                                                                                                                                       | Reasons for exclusion                                                                              |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Meijer (1979)                       | Elective mutism in children                                                                                                                                                                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| Melchior et al. (2012)              | Food insecurity and children's mental health: a prospective birth cohort study                                                                                                                                              | No assessment of anxiety in fathers                                                                |
| Melnyk et al. (2006)                | Reducing premature infants' length of stay and improving parents' mental health outcomes with the Creating Opportunities for Parent Empowerment (COPE) Neonatal Intensive Care Unit Program: A randomized, controlled trial | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Mendes and de Oliveira Ramos (2020) | Parental conceptions about child emotional development                                                                                                                                                                      | No assessment of anxiety in fathers                                                                |
| Mensah and Kiernan (2009)           | Parents' mental health and children's cognitive and social development - Families in England in the Millennium Cohort Study                                                                                                 | No assessment of anxiety in fathers                                                                |
| Merali et al. (2019)                | Maternal and paternal perinatal depressive symptoms associate with 2-and 3-year-old children's behaviour: findings from the APrON longitudinal study                                                                        | No assessment of anxiety in fathers                                                                |
| Merikangas et al. (2016)            | Parental age and offspring psychopathology in the philadelphia neurodevelopmental cohort                                                                                                                                    | No assessment of anxiety in fathers                                                                |
| Merkel et al. (1993)                | Perceived parental characteristics of patients with obsessive compulsive disorder, depression, and panic disorder                                                                                                           | No assessment of anxiety in fathers                                                                |
| Messer and Beidel (1994)            | Psychosocial correlates of childhood anxiety disorders                                                                                                                                                                      | No assessment of anxiety in fathers                                                                |
| Mevorach et al. (2021)              | The relationship between the plasma proinflammatory cytokine levels of depressed/anxious children and their parents                                                                                                         | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Middeldorp et al. (2014)            | Spouse and parent-offspring correlations for psychiatric symptoms in a clinical sample                                                                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Middeldorp et al. (2016)            | The course of symptoms of anxiety and depression: The role of genetic factors, comorbidity, and the association with parental symptoms                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Middeldorp et al. (2016)            | Parents of children with psychopathology: psychiatric problems and the association with their child's problems                                                                                                              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Miljkovitch et al. (2007)           | Three-year-olds' attachment play narratives and their associations with internalizing problems                                                                                                                              | No assessment of anxiety in fathers                                                                |
| Miller (2005)                       | Family members' expectations for involvement with their first year college students                                                                                                                                         | No assessment of anxiety in fathers                                                                |
| Miller et al. (2020)                | 133. Efficacy of a Primary Care-Based Intervention to Promote Parent-Teen Communication and Well-Being: A Randomized Controlled Trial                                                                                       | No assessment of anxiety in fathers                                                                |
| Mills (2003)                        | Possible antecedents and developmental implications of shame in young girls                                                                                                                                                 | No assessment of anxiety in fathers                                                                |
| Mitchell and Abraham (2018)         | Parental mental illness and the transition to college: Coping, psychological adjustment, and parent-child relationships                                                                                                     | No assessment of anxiety in fathers                                                                |
| Mitchum (1999)                      | The effects of group counseling on the self-esteem, anxiety, and behavior of children with deployed parents                                                                                                                 | No assessment of anxiety in fathers                                                                |
| Moe et al. (2019)                   | Little in Norway: A prospective longitudinal community-based cohort from pregnancy to child age 18 months                                                                                                                   | No assessment of anxiety in fathers                                                                |
| Moghaddam et al. (2014)             | The comparison of behavioral and emotional problems in children with a bipolar parent and children with healthy parents in Zahedan, Iran, 2011                                                                              | No assessment of anxiety in fathers                                                                |
| Mohammadi et al. (2019)             | Prevalence and correlates of psychiatric disorders in a national survey of Iranian children and adolescents                                                                                                                 | No assessment of anxiety in fathers                                                                |

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| Author (year)                   | Title                                                                                                                                                                  | Reasons for exclusion                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Mohammadi et al. (2019)         | The prevalence, comorbidity and socio-demographic factors of depressive disorder among Iranian children and adolescents: To identify the main predictors of depression | No assessment of anxiety in fathers                                                                |
| Mohebbi et al. (2019)           | Dental fear and its determinants in 7-11-year-old children in Tehran, Iran                                                                                             | No assessment of anxiety in fathers                                                                |
| Moller et al. (2014)            | Social referencing and child anxiety: The evolutionary based role of fathers' versus mothers' signals                                                                  | No assessment of anxiety in fathers                                                                |
| Moller et al. (2014)            | Dimensional assessment of anxiety disorders in parents and children for DSM-5                                                                                          | No assessment of anxiety in fathers                                                                |
| Moloney (1952)                  | The battle for mental health                                                                                                                                           | Review/commentary papers and research protocols (no new data/findings)                             |
| Montgomery (1998)               | Refugee children from the Middle East                                                                                                                                  | No assessment of anxiety in fathers                                                                |
| Montgomery (1998)               | Rehabilitation and Research Centre for Torture Victims, Philippines, December 1989: Refugee children from the Middle East                                              | Duplicate                                                                                          |
| Montgomery (1998)               | Refugee children from the Middle East - Preface                                                                                                                        | Duplicate                                                                                          |
| Montgomery and Foldspang (2001) | Traumatic experience and sleep disturbance in refugee children from the Middle East                                                                                    | No assessment of anxiety in fathers                                                                |
| Monzani et al. (2020)           | The Role of Paternal Accommodation of Paediatric OCD Symptoms: Patterns and Implications for Treatment Outcomes                                                        | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Moran Etter (2014)              | Longitudinal effects of improving inter-parental relationships in low-income couples: Child outcomes                                                                   | No assessment of anxiety in fathers                                                                |
| Moreno et al. (2008)            | Fathers' Ratings in the Assessment of Their Child's Anxiety Symptoms: A Comparison to Mothers' Ratings and Their Associations With Paternal Symptomatology             | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Morris (1998)                   | Family environment and parents' psychological and somatic symptoms as predictors of affective and physical symptom behaviors in unexplained pediatric syncope          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Morris et al. (2016)            | The indirect effect of positive parenting on the relationship between parent and sibling bereavement outcomes after the death of a child                               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Moss et al. (2006)              | Attachment and self-reported internalizing and externalizing behavior problems in a school period                                                                      | No assessment of anxiety in fathers                                                                |
| Mulder et al. (2014)            | Good Two-Year Outcome for Parents Whose Infants Were Admitted to a Neonatal Intensive Care Unit                                                                        | No quantitative emotional/behavioural offspring outcomes                                           |
| Mullins et al. (2021)           | Paternal expressed emotion influences psychobiological indicators of threat and safety learning in daughters: A preliminary study                                      | No assessment of anxiety in fathers                                                                |
| Mundy (2014)                    | Preliminary examination of a group CBT treatment for the parents of young anxious children                                                                             | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Muris (2002)                    | Parental rearing behaviors and worry of normal adolescents                                                                                                             | No assessment of anxiety in fathers                                                                |
| Muris et al. (1996)             | The role of parental fearfulness and modeling in children's fear                                                                                                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Murphy et al. (2021)            | The developmental cascade of early parenting, emergence of executive functioning, and emotional symptoms across childhood                                              | No assessment of anxiety in fathers                                                                |
| Naar (1996)                     | History of abuse and perceived attachments as predictors of psychiatric symptoms in adolescence                                                                        | No assessment of anxiety in fathers                                                                |

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| Author (year)                | Title                                                                                                                                                                                                         | Reasons for exclusion                                                                              |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Nakic Rados (2021)           | Parental Sensitivity and Responsiveness as Mediators Between Postpartum Mental Health and Bonding in Mothers and Fathers                                                                                      | No quantitative emotional/behavioural offspring outcomes                                           |
| Nasreen et al. (2022)        | Impact of parental perinatal depressive and anxiety symptoms trajectories on early parent-infant impaired bonding: a cohort study in east and west coasts of Malaysia                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Nawa et al. (2021)           | Associations between Paternal Anxiety and Infant Weight Gain                                                                                                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Nevriana et al. (2020)       | Association between maternal and paternal mental illness and risk of injuries in children and adolescents: nationwide register based cohort study in Sweden                                                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Newell (2005)                | Young adult attachment: Predictors and outcomes                                                                                                                                                               | No assessment of anxiety in fathers                                                                |
| Nichelli et al. (2009)       | Quality of life and psychological adaptation in survivors of childhood leukemia and their siblings                                                                                                            | No assessment of anxiety in fathers                                                                |
| Nicolai et al. (2017)        | The Roles of Fathers' Posttraumatic Stress Symptoms and Adult Offspring's Differentiation of the Self in the Intergenerational Transmission of Captivity Trauma                                               | No assessment of anxiety in fathers                                                                |
| Nielsen et al. (2019)        | Risk of childhood psychiatric disorders in children of refugee parents with post-traumatic stress disorder: a nationwide, register-based, cohort study                                                        | No assessment of anxiety in fathers                                                                |
| Nieri (2017)                 | Relationship between parental sensitivity and attachment styles, personality and empathic capacity, according to sociodemographic variables                                                                   | No assessment of anxiety in fathers                                                                |
| Niimi and Uemura (1984)      | Stresses on the parents of handicapped children of school age: The structure of stresses                                                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Nijssens et al. (2020)       | The mediating role of parental reflective functioning in child social-emotional development                                                                                                                   | No assessment of anxiety in fathers                                                                |
| Noguchi and Ollendick (2010) | Is family expressiveness as reported by mothers and fathers related to children's social anxiety symptoms?                                                                                                    | No assessment of anxiety in fathers                                                                |
| Nojabae et al. (2012)        | Analytic-comparative study of biological, cognitive, psychological, and social characteristics of parents having more than one exceptional children and parents having normal children in mazandaran province | No quantitative emotional/behavioural offspring outcomes                                           |
| Nunn et al. (1983)           | Perceptions of personal and familial adjustment by children from intact, single-parent, and reconstituted families                                                                                            | No assessment of anxiety in fathers                                                                |
| O'Connor et al. (2020)       | Parent and child emotion and distress responses associated with parental accommodation of child anxiety symptoms                                                                                              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| O'Donnell et al. (2013)      | Prenatal maternal mood is associated with altered diurnal cortisol in adolescence                                                                                                                             | No quantitative emotional/behavioural offspring outcomes                                           |
| O'Donnell et al. (2014)      | The persisting effect of maternal mood in pregnancy on childhood psychopathology                                                                                                                              | No assessment of anxiety in fathers                                                                |
| O'Hara (2015)                | Paternal perinatal depression: Concurrent and longitudinal impact                                                                                                                                             | Review/commentary papers and research protocols (no new data/findings)                             |
| O'Toole et al. (2017)        | Intergenerational transmission of post-traumatic stress disorder in Australian Vietnam veterans' families                                                                                                     | No assessment of anxiety in fathers                                                                |
| O'Toole et al. (2018)        | Growing up with a father with PTSD: The family emotional climate of the children of Australian Vietnam veterans                                                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Obrien et al. (1995)         | Relation among marital conflict, child coping, and child adjustment                                                                                                                                           | No assessment of anxiety in fathers                                                                |
| Obunai (2011)                | Parents' worries about discipline, parents' personal growth, and children's cognition of their parents' discipline                                                                                            | No assessment of anxiety in fathers                                                                |

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| Author (year)                      | Title                                                                                                                                                                | Reasons for exclusion                                                                              |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Ogletree et al. (2019)             | Depression, Religiosity, and Parenting Styles among Young Latter-Day Saint Adolescents                                                                               | No assessment of anxiety in fathers                                                                |
| Ohannessian and Hesselbrock (2009) | A finer examination of the role that negative affect plays in the relationship between paternal alcoholism and the onset of alcohol and marijuana use                | No assessment of anxiety in fathers                                                                |
| Ohannessian et al. (1995)          | Discrepancies in adolescents' and parents' perceptions of family functioning and adolescent emotional adjustment                                                     | No assessment of anxiety in fathers                                                                |
| Ohannessian et al. (2005)          | The Relationship Between Parental Psychopathology and Adolescent Psychopathology: An Examination of Gender Patterns                                                  | No assessment of anxiety in fathers                                                                |
| Olema et al. (2014)                | The hidden effects of child maltreatment in a war region: correlates of psychopathology in two generations living in Northern Uganda                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Olino et al. (2006)                | Sibling similarity for MDD: Evidence for shared familial factors                                                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Olino et al. (2014)                | Testing models of psychopathology in preschool-aged children using a structured interview-based assessment                                                           | No assessment of anxiety in fathers                                                                |
| Ollendick (1979)                   | Parental locus of control and the assessment of children's personality characteristics                                                                               | No assessment of anxiety in fathers                                                                |
| Onatsu-Arvilommi et al. (1998)     | Mothers' and fathers' well-being, parenting styles, and their children's cognitive and behavioural strategies at primary school                                      | No assessment of anxiety in fathers                                                                |
| Oransky et al. (2013)              | Caregiver and Youth Agreement Regarding Youths' Trauma Histories: Implications for Youths' Functioning After Exposure to Trauma                                      | No assessment of anxiety in fathers                                                                |
| Orri et al. (2019)                 | Harsh parenting practices mediate the association between parent affective profiles and child adjustment outcomes: Differential associations for mothers and fathers | No assessment of anxiety in fathers                                                                |
| Orri et al. (2021)                 | Cohort Profile: Quebec Longitudinal Study of Child Development (QLSCD)                                                                                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Otto et al. (2016)                 | Parenting behaviors of mothers and fathers of preschool age children with internalizing disorders                                                                    | No assessment of anxiety in fathers                                                                |
| Ozdemir et al. (2015)              | Family patterns of psychopathology in psychiatric disorders                                                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Palosaari et al. (2013)            | Intergenerational effects of war trauma among Palestinian families mediated via psychological maltreatment                                                           | No assessment of anxiety in fathers                                                                |
| Pan et al. (2021)                  | Parents' attachment styles and adolescents' regulatory emotional self-efficacy: The mediating role of adolescents' attachment to parents in china                    | No assessment of anxiety in fathers                                                                |
| Parfitt et al. (2013)              | The impact of parents' mental health on parent-baby interaction: A prospective study                                                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| Parfitt et al. (2015)              | The impact of parents' mental health on parent-infant interaction: A prospective study                                                                               | Duplicate                                                                                          |
| Paris et al. (1994)                | Risk factors for borderline personality in male outpatients                                                                                                          | No assessment of anxiety in fathers                                                                |
| Parker (1965)                      | The role of a specific father-child interaction pattern in the genesis and psycho-analytic treatment of obsessional character neurosis                               | Review/commentary papers and research protocols (no new data/findings)                             |
| Partain et al. (2021)              | Parents' obedience beliefs and autonomy granting: The role of child externalizing and parent anxiety                                                                 | Duplicate                                                                                          |
| Pasalich et al. (2012)             | Emotional Communication in Families of Conduct Problem Children With High Versus Low Callous-Unemotional Traits                                                      | No assessment of anxiety in fathers                                                                |

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| Author (year)               | Title                                                                                                                                                       | Reasons for exclusion                                                                              |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Pavlova (2020)              | 26.1 Anxiety in offspring of parents with major mood disorders: the role of comorbid anxiety disorders in parents and sex-specific parent of origin effects | Duplicate                                                                                          |
| Pearlman (1993)             | The impact of attachment and fear of success in late adolescent females                                                                                     | No assessment of anxiety in fathers                                                                |
| Pearson et al. (2016)       | Maternal perinatal mental health and offspring academic achievement at age 16: the mediating role of childhood executive function                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Pedersen (1992)             | Parents relations measured with PBI, mental-health and conduct disorder in young adolescents                                                                | No assessment of anxiety in fathers                                                                |
| Pedersen (1994)             | Parental relations, mental health, and delinquency in adolescents                                                                                           | No assessment of anxiety in fathers                                                                |
| Peiponen (2006)             | The association of parental alcohol abuse and depression with severe emotional and behavioural problems in adolescents: A clinical study                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Peisah et al. (2004)        | Children of a cohort of depressed patients 25 years later: Psychopathology and relationships                                                                | No assessment of anxiety in fathers                                                                |
| Peleg-Popoko (2002)         | Children's test anxiety and family interaction patterns                                                                                                     | No assessment of anxiety in fathers                                                                |
| Pereira et al. (2013)       | Parental anxiety and overprotection scale: A psychometric study with a sample of parents of school age-children                                             | No assessment of anxiety in fathers                                                                |
| Pereira et al. (2014)       | The relationships among parental anxiety, parenting, and children's anxiety: The mediating effects of children's cognitive vulnerabilities                  | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Perrson et al. (1984)       | Prognostic factors with four treatment methods for phobic disorders                                                                                         | No assessment of anxiety in fathers                                                                |
| Pesonen et al. (2003)       | Parental perception of infant temperament: Does parents' joint attachment matter?                                                                           | No assessment of anxiety in fathers                                                                |
| Petanidou et al. (2013)     | Parental and Familial Determinants of Adolescents' Subjective Health Complaints: Evidence from a Greek Cross-Sectional Study                                | No quantitative emotional/behavioural offspring outcomes                                           |
| Philipp (1983)              | The role of recollected anxiety in parental adaptation to low birthweight infants                                                                           | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Phillips (2009)             | Temperament, parental anxiety and their role in the development of child anxious psychopathology                                                            | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Pimentel (2005)             | An examination of cross-informant consistency in the assessment of anxious youth: Predictors of agreement with the therapist as "gold standard"             | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Pineros-Leano et al. (2021) | Prevalence and predictors of parental depressive episodes: Results from a 15-year longitudinal study                                                        | No quantitative emotional/behavioural offspring outcomes                                           |
| Pirkola et al. (2005)       | Childhood adversities as risk factors for adult mental disorders. Results from the Health 2000 study                                                        | No assessment of anxiety in fathers                                                                |
| Pizzo et al. (2021)         | Parental Overprotection and Sleep Problems in Young Children                                                                                                | Duplicate                                                                                          |
| Planalp et al. (2019)       | Parenting in context: Marital adjustment, parent affect, and child temperament in complex families                                                          | No assessment of anxiety in fathers                                                                |
| Podell et al. (2011)        | Mothers and fathers in family cognitive-behavioral therapy for anxious youth                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Poltrock (2007)             | Parenting variables associated with childhood anxiety: Parental warmth as a moderator of overly controlling parenting                                       | No assessment of anxiety in fathers                                                                |

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| Author (year)                     | Title                                                                                                                                                                            | Reasons for exclusion                                                                              |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Pontillo et al. (2020)            | Clinical significance of family accommodation and parental psychological distress in a sample of children and adolescents with obsessive-compulsive disorder aged 8-17 years old | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Popp et al. (2017)                | Parent-Child Diagnostic Agreement on Anxiety Symptoms with a Structured Diagnostic Interview for Mental Disorders in Children                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Preuss et al. (2002)              | Mood and anxiety symptoms among 140 children from alcoholic and control families                                                                                                 | No assessment of anxiety in fathers                                                                |
| Price-Evans and Field (2008)      | A neglectful parenting style moderates the effect of the verbal threat information pathway on children's heart rate responses to novel animals                                   | No assessment of anxiety in fathers                                                                |
| Probst (2003)                     | Parental attachment and adolescents: Religiosity and antisocial behavior                                                                                                         | No assessment of anxiety in fathers                                                                |
| Prout (2015)                      | Friendship quality of early adolescent girls in relation to maternal and paternal parenting, social anxiety, and interpersonal skill                                             | No assessment of anxiety in fathers                                                                |
| Pruett et al. (2019)              | Supporting Father Involvement: An intervention with community and child welfare-referred couples                                                                                 | No assessment of anxiety in fathers                                                                |
| Pu and Rodriguez (2022)           | Child and parent factors predictive of mothers' and fathers' perceived family functioning                                                                                        | No assessment of anxiety in fathers                                                                |
| Punamaki et al. (2006)            | Psychological distress and resources among siblings and parents exposed to traumatic events                                                                                      | No assessment of anxiety in fathers                                                                |
| Quinnell (2002)                   | Postpartum posttraumatic stress as a risk factor for atypical cognitive development in high-risk infants                                                                         | No assessment of anxiety in fathers                                                                |
| Radke-Yarrow et al. (1985)        | Patterns of attachment in two- and three-year-olds in normal families and families with parental depression                                                                      | No assessment of anxiety in fathers                                                                |
| Radke-Yarrow et al. (1992)        | Young children of affectively ill parents: A longitudinal study of psychosocial development                                                                                      | No assessment of anxiety in fathers                                                                |
| Rados (2021)                      | Parental Sensitivity and Responsiveness as Mediators Between Postpartum Mental Health and Bonding in Mothers and Fathers                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Raffagnato et al. (2021)          | The covid-19 pandemic: A longitudinal study on the emotional-behavioral sequelae for children and adolescents with neuropsychiatric disorders and their families                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Ram and Rao (1994)                | A study of behaviour disorders in moderately mentally retarded children and their relation to parental attitude                                                                  | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Ramchandani and Psychogiou (2009) | Paternal psychiatric disorders and children's psychosocial development                                                                                                           | Review/commentary papers and research protocols (no new data/findings)                             |
| Ramchandani et al. (2011)         | Paternal depression: An examination of its links with father, child and family functioning in the postnatal period                                                               | No assessment of anxiety in fathers                                                                |
| Ramchandani et al. (2011)         | Paternal depression: an examination of its links with father, child and family functioning in the postnatal period                                                               | Duplicate                                                                                          |
| Ramirez (2001)                    | Childhood antecedents of adult anxiety: A 36-year longitudinal study                                                                                                             | No assessment of anxiety in fathers                                                                |
| Ramos (2007)                      | Daily marital conflict and children's daily mood and behavior: The moderating roles of marital violence exposure and children's psychological distress                           | No assessment of anxiety in fathers                                                                |
| Ranoyen et al. (2015)             | Associations Between Internalizing Problems in Adolescent Daughters Versus Sons and Mental Health Problems in Mothers Versus Fathers (The HUNT Study)                            | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                | Title                                                                                                                                              | Reasons for exclusion                                                                              |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Ranoyen et al. (2015)        | Familial aggregation of anxiety and depression in the community: the role of adolescents' self-esteem and physical activity level (the HUNT Study) | No assessment of anxiety in fathers                                                                |
| Rapee et al. (2010)          | Altering the trajectory of anxiety in at-risk young children                                                                                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Rasing et al. (2015)         | The association between perceived maternal and paternal psychopathology and depression and anxiety symptoms in adolescent girls                    | No assessment of anxiety in fathers                                                                |
| Rasing et al. (2019)         | Depression and anxiety symptoms in female adolescents: Relations with parental psychopathology and parenting behavior                              | Duplicate                                                                                          |
| Rasing et al. (2020)         | Depression and Anxiety Symptoms in Female Adolescents: Relations with Parental Psychopathology and Parenting Behavior                              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Rastogi (1984)               | Personality pattern of parents of mentally retarded children                                                                                       | No assessment of anxiety in fathers                                                                |
| Rathi (2021)                 | Study of Sociodemographic Profile and Psychopathology of Mentally and Physically Handicapped Children and their Parents                            | No assessment of anxiety in fathers                                                                |
| Ravi et al. (2008)           | Is there a relationship between parental self-reported psychopathology and symptom severity in adolescents with Anorexia Nervosa?                  | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Razaz et al. (2016)          | Incidence of Mood or Anxiety Disorders in Children of Parents with Multiple Sclerosis                                                              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Razaz et al. (2016)          | Peripartum depression in parents with multiple sclerosis and psychiatric disorders in children                                                     | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Reeb et al. (2015)           | Long-term effects of fathers' depressed mood on youth internalizing symptoms in early adulthood                                                    | No assessment of anxiety in fathers                                                                |
| Reiter-Purtill et al. (2008) | Parental distress, family functioning, and social support in families with and without a child with neurofibromatosis 1                            | No quantitative emotional/behavioural offspring outcomes                                           |
| Rendina (2018)               | Attachment and parental invalidation contributes to borderline personality disorder symptoms in a college-aged sample                              | No assessment of anxiety in fathers                                                                |
| Rice et al. (2017)           | Antecedents of new-onset major depressive disorder in children and adolescents at high familial risk                                               | No assessment of anxiety in fathers                                                                |
| Richman and Flaherty (1990)  | Gender differences in medical student distress: contributions of prior socialization and current role-related stress                               | No assessment of anxiety in fathers                                                                |
| Rickman and Davidson (1994)  | Personality and behavior in parents of temperamentally inhibited and uninhibited children                                                          | No quantitative emotional/behavioural offspring outcomes                                           |
| Riggio (2001)                | Long-term consequences of parental marital conflict and divorce for family relationships in young adulthood                                        | No assessment of anxiety in fathers                                                                |
| Riina et al. (2020)          | Bidirectional Associations between Youth Adjustment and Mothers' and Fathers' Coparenting Conflict                                                 | No assessment of anxiety in fathers                                                                |
| Riskind et al. (2004)        | Developmental Antecedents of the Looming Maladaptive Style: Parental Bonding and Parental Attachment Insecurity                                    | No assessment of anxiety in fathers                                                                |
| Robertson (1972)             | Parent-child relationships and homosexuality                                                                                                       | No assessment of anxiety in fathers                                                                |
| Robinson and Barret (1987)   | Self-concept and anxiety of adolescent and adult fathers                                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Robinson et al. (2007)       | Parent and family factors associated with child adjustment to pediatric cancer                                                                     | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                  | Title                                                                                                                                                               | Reasons for exclusion                                                                              |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Roccella et al. (2019)         | Parental Stress and Parental Ratings of Behavioral Problems of Enuretic Children                                                                                    | No assessment of anxiety in fathers                                                                |
| Rochat et al. (2019)           | Maternal alcohol use and children's emotional and cognitive outcomes in rural South Africa                                                                          | No assessment of anxiety in fathers                                                                |
| Roche et al. (2016)            | Parent and Child Perceptions of Child Health after Sibling Death                                                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Rodas et al. (2016)            | Unsupportive parenting and internalising behaviour problems in children with or without intellectual disability                                                     | No assessment of anxiety in fathers                                                                |
| Rodriguez Criado et al. (2015) | Prevalence of psychiatric illness in parents of children treated                                                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Rodriguez Franco et al. (2002) | Anxiety in children of male alcoholics under treatment                                                                                                              | No assessment of anxiety in fathers                                                                |
| Roff and Knight (1981)         | Family characteristics, childhood symptoms, and adult outcome in schizophrenia                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Roggman et al. (2002)          | Getting dads involved: Predictors of father involvement in early head start and with their children                                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| Rognmo et al. (2012)           | Paternal and maternal alcohol abuse and offspring mental distress in the general population: the Nord-Trondelag health study                                        | No assessment of anxiety in fathers                                                                |
| Rojo-Wissar et al. (2015)      | Higher retrospectively reported maternal care is associated with better sleep quality and less anxiety in young adults                                              | No assessment of anxiety in fathers                                                                |
| Roopnarine et al. (1990)       | Day care children's play behaviors: Relationship to their mothers' and fathers' assessments of their parenting behaviors, marital stress, and marital companionship | No quantitative emotional/behavioural offspring outcomes                                           |
| Roos et al. (2021)             | Supporting families to protect child health: Parenting quality and household needs during the COVID-19 pandemic                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Root (2003)                    | Parental emotion processes, family risk status, and patterns of emotionality in children                                                                            | No assessment of anxiety in fathers                                                                |
| Rosa-Alcazar et al. (2021)     | Predictors of Parental Accommodation and Response Treatment in Young Children With Obsessive-Compulsive Disorder                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Rosenbaum and Ronen (1997)     | Parents' and children's appraisals of each other's anxiety while facing a common threat                                                                             | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Rosenthal (1990)               | Inconsistent parenting and anxiety in the child                                                                                                                     | Review/commentary papers and research protocols (no new data/findings)                             |
| Rosnati et al. (2013)          | Family and social relationships and psychosocial well-being in Italian families with internationally adopted and non-adopted children                               | No quantitative emotional/behavioural offspring outcomes                                           |
| Ross and Wynne (2010)          | Parental depression and divorce and adult children's well-being: The role of family unpredictability                                                                | No assessment of anxiety in fathers                                                                |
| Rothen et al. (2009)           | Parent-child agreement and prevalence estimates of diagnoses in childhood: Direct interview versus family history method                                            | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Rothenberg (2017)              | Gender dyad effects linking dysfunctional parenting with depression and anxiety                                                                                     | No assessment of anxiety in fathers                                                                |
| Rothon et al. (2012)           | Family social support, community "social capital" and adolescents' mental health and educational outcomes: a longitudinal study in England                          | No assessment of anxiety in fathers                                                                |

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| Author (year)                    | Title                                                                                                                                                        | Reasons for exclusion                                                                              |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Rousseau et al. (2019)           | Ethological study of the first infant-parent interactions at birth                                                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Rowe and Fisher (2010)           | Development of a universal psycho-educational intervention to prevent common postpartum mental disorders in primiparous women: a multiple method approach    | Review/commentary papers and research protocols (no new data/findings)                             |
| Sackl-Pammer et al. (2015)       | Psychopathology among parents of children and adolescents with separation anxiety disorder                                                                   | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Sahid et al. (2019)              | Maternal and paternal effects on offspring internalising problems: findings from family data and extended GCTA analyses                                      | No assessment of anxiety in fathers                                                                |
| Sahiner et al. (2020)            | The effect of parent and child operational stress on postoperative pain level in children                                                                    | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Sahithya and Raman (2020)        | Sociodemographic correlates of anxiety disorders in children: A cross-sectional study in an indian outpatient setting                                        | Duplicate                                                                                          |
| Saisto et al. (2008)             | Longitudinal study on the predictors of parental stress in mothers and fathers of toddlers                                                                   | No assessment of anxiety in fathers                                                                |
| Salari et al. (2014)             | Child behaviour problems, parenting behaviours and parental adjustment in mothers and fathers in Sweden                                                      | No assessment of anxiety in fathers                                                                |
| Salas and Lopez-Alvarenga (2010) | Parental alcoholism can cause obesity and unspecific eating disorders, based on structural equation modeling                                                 | No assessment of anxiety in fathers                                                                |
| Salmon (2013)                    | Perinatal mental health in the Australian family law context: Clinicians and practitioners taking action together                                            | Review/commentary papers and research protocols (no new data/findings)                             |
| Sancak and Ozgen Hergul (2021)   | Obsessive-compulsive symptoms in schizophrenia patients and their first-degree relatives and the association with subclinical psychotic symptoms             | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Sancakglu and Sayar (2012)       | Relation between socioeconomic status and depression, anxiety, and self-esteem in early adolescents                                                          | No assessment of anxiety in fathers                                                                |
| Sanford et al. (1995)            | Predicting the one-year course of adolescent major depression                                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Sanger et al. (1992)             | Relation between maternal characteristics and child behavior ratings: Implications for interpreting behavior checklists                                      | No assessment of anxiety in fathers                                                                |
| Sarala et al. (2022)             | Parental smoking and young adult offspring psychosis, depression and anxiety disorders and substance use disorder                                            | No assessment of anxiety in fathers                                                                |
| Sarrasin et al. (2019)           | Feeling Blue by Extension: Intrafamily Transmission and Economic Pressures Explain the Native-Immigrant Gap in Well-Being among Youth in Switzerland         | No assessment of anxiety in fathers                                                                |
| Sartor et al. (2007)             | The role of childhood risk factors in initiation of alcohol use and progression to alcohol dependence                                                        | No assessment of anxiety in fathers                                                                |
| Scanlan and Lewthwaite (1988)    | From stress to enjoyment: Parental and coach influences on young participants                                                                                | No assessment of anxiety in fathers                                                                |
| Scharf et al. (2012)             | Intergenerational concordance in Adult Attachment Interviews with mothers, fathers and adolescent sons and subsequent adjustment of sons to military service | No assessment of anxiety in fathers                                                                |
| Scharff et al. (2002)            | A controlled study of minimal-contact thermal biofeedback treatment in children with migraine                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |

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| Author (year)                    | Title                                                                                                                                                     | Reasons for exclusion                                                                              |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Schepank (1975)                  | [Discordance analysis of monozygotic twin pairs. Case study on psychogenesis]                                                                             | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Schneider et al. (2011)          | Disorder-specific cognitive-behavioral therapy for separation anxiety disorder in young children: A randomized waiting-list-controlled trial              | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Schopler and Loftin (1969)       | Thinking disorders in parents of young psychotic children                                                                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| Schopler and Loftin (1969)       | Thought disorders in parents of psychotic children: A function of test anxiety                                                                            | Duplicate                                                                                          |
| Schuckit et al. (2003)           | Correlates of externalizing symptoms in children from families of alcoholics and controls                                                                 | No assessment of anxiety in fathers                                                                |
| Segenreich et al. (2009)         | Anxiety and depression in parents of a Brazilian non-clinical sample of attention-deficit/ hyperactivity disorder (ADHD) students                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Segenreich et al. (2015)         | Multilevel analysis of ADHD, anxiety and depression symptoms aggregation in families                                                                      | No assessment of anxiety in fathers                                                                |
| Seibel (1997)                    | Experience with father, satisfaction with life and trait anxiety in college students                                                                      | No assessment of anxiety in fathers                                                                |
| Seiffge-Krenke and Escher (2018) | Delayed identity development, family relationships and psychopathology: Links between healthy and clinically disturbed youth                              | No assessment of anxiety in fathers                                                                |
| Selimbasic et al. (2017)         | Behavioral Problems and Emotional Difficulties at Children and Early Adolescents of the Veterans of War with Post-Traumatic Stress Disorder               | No assessment of anxiety in fathers                                                                |
| Selles et al. (2020)             | 24.5 Family presentations in pediatric OCD                                                                                                                | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Seteanu and Giosan (2021)        | Adverse childhood experiences in fathers and the consequences in their children                                                                           | No assessment of anxiety in fathers                                                                |
| Sgandurra (2001)                 | The relationship between family functioning and sibling adjustment in families with a child with a developmental disability                               | No assessment of anxiety in fathers                                                                |
| Shaikh et al. (2020)             | Parenting behaviors, marital discord and the mental health of young females: a cross-sectional study from Saudi Arabia                                    | No assessment of anxiety in fathers                                                                |
| Shamtoub (2014)                  | Intergenerational transmission of trauma and attachment in adult children of Iranian immigrants                                                           | No assessment of anxiety in fathers                                                                |
| Shek (1989)                      | Perceptions of parental treatment styles and psychological well-being in Chinese adolescents                                                              | No assessment of anxiety in fathers                                                                |
| Shenaar-Golan et al. (2021)      | Paternal Feelings and Child's Anxiety: The Mediating Role of Father-Child Insecure Attachment and Child's Emotional Regulation                            | No assessment of anxiety in fathers                                                                |
| Sherr et al. (2006)              | A feasibility study on recruiting fathers of young children to examine the impact of paternal depression on child development                             | No quantitative emotional/behavioural offspring outcomes                                           |
| Shin et al. (2008)               | Predictors of self-reported depression in Korean children 9 to 12 years of age                                                                            | No assessment of anxiety in fathers                                                                |
| Shinohara (1992)                 | A clinical study of early childhood obsessive-compulsive disorder                                                                                         | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Shorer and Leibovich (2020)      | Young children's emotional stress reactions during the COVID-19 outbreak and their associations with parental emotion regulation and parental playfulness | Duplicate                                                                                          |

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| Author (year)                  | Title                                                                                                                                                                                                      | Reasons for exclusion                                                                              |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Shorer and Leibovich (2020)    | Young children's emotional stress reactions during the covid-19 outbreak and their associations with parental emotion regulation and parental playfulness                                                  | No assessment of anxiety in fathers                                                                |
| Shortt et al. (2001)           | The influence of family and experimental context on cognition in anxious children                                                                                                                          | No assessment of anxiety in fathers                                                                |
| Siciliano Avila (2012)         | Fathers' attachment styles and father/child relationships by partner and caregiver types                                                                                                                   | No assessment of anxiety in fathers                                                                |
| Sidana (1975)                  | Socio-economic status of family and fear in children                                                                                                                                                       | No assessment of anxiety in fathers                                                                |
| Sifaki et al. (2021)           | Reciprocal relationships between paternal psychological distress and child internalising and externalising difficulties from 3 to 14 years: a cross-lagged analysis                                        | No assessment of anxiety in fathers                                                                |
| Silva et al. (2021)            | Associations of Maternal Diabetes During Pregnancy With Psychiatric Disorders in Offspring During the First 4 Decades of Life in a Population-Based Danish Birth Cohort                                    | No assessment of anxiety in fathers                                                                |
| Simpson et al. (2018)          | Family functioning and adolescent internalizing symptoms: A latent profile analysis                                                                                                                        | No assessment of anxiety in fathers                                                                |
| Sirchia et al. (2012)          | Selective Mutism: An expression of specific parental setting                                                                                                                                               | No assessment of anxiety in fathers                                                                |
| Skoranski (2021)               | Modeling profiles of mothers' and fathers' mental health and stress physiology and physiological coregulation with preschool-aged children                                                                 | Duplicate                                                                                          |
| Skreden et al. (2008)          | Psychological distress in mothers and fathers of preschool children: A 5-year follow-up study after birth                                                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Slone et al. (2012)            | Parenting style as a moderator of effects of political violence: Cross-cultural comparison of Israeli Jewish and Arab children                                                                             | No assessment of anxiety in fathers                                                                |
| Smith (2014)                   | Cognitive-behavioral treatment of childhood anxiety: Examining a parent consultation model                                                                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Smith and Wessel (2019)        | The primordial prevention project: Pilot study of disclosing child's diabetes genetic risk information                                                                                                     | No quantitative emotional/behavioural offspring outcomes                                           |
| Snyder et al. (2016)           | Parent-child relationship quality and family transmission of parent posttraumatic stress disorder symptoms and child externalizing and internalizing symptoms following fathers' exposure to combat trauma | No assessment of anxiety in fathers                                                                |
| Soble (1955)                   | Some observations of childhood schizophrenia                                                                                                                                                               | No assessment of anxiety in fathers                                                                |
| Soenens et al. (2005)          | The intergenerational transmission of perfectionism: parents' psychological control as an intervening variable                                                                                             | No assessment of anxiety in fathers                                                                |
| Solantaus and Paavonen (2009)  | Impact of parents' mental health disorders on psychiatric problems of the offspring                                                                                                                        | Review/commentary papers and research protocols (no new data/findings)                             |
| Solantaus-Simula et al. (2002) | Children's Responses to Low Parental Mood. II: Associations with Family Perceptions of Parenting Styles and Child Distress                                                                                 | No assessment of anxiety in fathers                                                                |
| Solis-Camara et al. (2003)     | Developmental expectations and discipline and nurturing practices of married couples with children with special needs                                                                                      | No assessment of anxiety in fathers                                                                |
| Soni and Kumari (2017)         | The Role of Parental Math Anxiety and Math Attitude in Their Children's Math Achievement                                                                                                                   | No assessment of anxiety in fathers                                                                |
| Sonnenschein et al. (2012)     | Maternal psychological distress during pregnancy and wheezing in preschool children. The generation r study                                                                                                | No assessment of anxiety in fathers                                                                |
| Sorenson et al. (2009)         | Parental psychiatric hospitalisation and offspring schizophrenia                                                                                                                                           | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                    | Title                                                                                                                                                                              | Reasons for exclusion                                                                              |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Spada et al. (2012)              | Paternal overprotection and metacognitions as predictors of worry and anxiety                                                                                                      | No assessment of anxiety in fathers                                                                |
| Spangler and Langenfelder (2001) | Test anxiety and physiological responses of primary school children to written exams: Emotional disposition, coping styles and parental caregiving style                           | No assessment of anxiety in fathers                                                                |
| Spence et al. (2020)             | Internet-delivered cognitive behavior therapy with minimal therapist support for anxious children and adolescents: predictors of response                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Spiel (2019)                     | Intergenerational transmission of trauma on young adults' interpersonal functioning: The mediating role of attachment                                                              | No assessment of anxiety in fathers                                                                |
| Spittle et al. (2014)            | Neurobehaviour between birth and 40 weeks' gestation in infants born <30 weeks' gestation and parental psychological wellbeing: Predictors of brain development and child outcomes | No quantitative emotional/behavioural offspring outcomes                                           |
| Spokas (2008)                    | Examination of social anxiety and its relation to parenting styles and practices                                                                                                   | No assessment of anxiety in fathers                                                                |
| Stark et al. (1996)              | Cognitive triad: Relationship to depressive symptoms, parents' cognitive triad, and perceived parental messages                                                                    | No assessment of anxiety in fathers                                                                |
| Stassart et al. (2017)           | The role of parental anxiety sensitivity and learning experiences in children's anxiety sensitivity                                                                                | No assessment of anxiety in fathers                                                                |
| Staudenmayer (1981)              | Parental anxiety and other psychosocial factors associated with childhood asthma                                                                                                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Stearns and McKinney (2018)      | Transmission of religiosity from parent to child: Moderation by perceived parental depression and anxiety                                                                          | No assessment of anxiety in fathers                                                                |
| Stearns and McKinney (2020)      | Perceived Parental Anxiety and Depressive Problems and Emerging Adult Oppositional Defiant Problems: Moderated Mediation by Psychological and Physical Maltreatment and Gender     | No assessment of anxiety in fathers                                                                |
| Steenhoff et al. (2021)          | Internalizing and externalizing problems in preschool children: The role of mothers' and fathers' observed parenting behavior in a well-resourced sample                           | No assessment of anxiety in fathers                                                                |
| Stein (1995)                     | Intergenerational effects of ptsd: A hypothesis concerning mode of transmission                                                                                                    | No assessment of anxiety in fathers                                                                |
| Steinhausen et al. (2014)        | "Family aggregation and risk factors of obsessive-compulsive disorders in a nationwide three-generation study": Erratum                                                            | Duplicate                                                                                          |
| Stevens (2002)                   | Coparenting school-aged children: Parental interdependence, marital conflict and children's psychosocial adjustment                                                                | No assessment of anxiety in fathers                                                                |
| Stewart et al. (1986)            | The impact of custodial arrangement on the adjustment of recently divorced fathers                                                                                                 | No assessment of anxiety in fathers                                                                |
| Stolzenberg (1995)               | Parental beliefs about the development of adolescent friendships                                                                                                                   | No assessment of anxiety in fathers                                                                |
| Stover (2004)                    | Fathers' meta-emotion and children's social status                                                                                                                                 | No assessment of anxiety in fathers                                                                |
| Sucksdorff et al. (2014)         | Bipolar disorder and parental psychopathology                                                                                                                                      | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Sulestrowska and Borys (1978)    | Mental disorders in children of schizophrenic parents                                                                                                                              | No assessment of anxiety in fathers                                                                |
| Suleyman et al. (2014)           | Clinical and socio-demographic characteristics of adolescents with dissociative disorders                                                                                          | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Sumer and Harma (2015)           | Parental attachment anxiety and avoidance predicting child's anxiety and academic efficacy in middle childhood                                                                     | No assessment of anxiety in fathers                                                                |

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| Author (year)                | Title                                                                                                                                                                                  | Reasons for exclusion                                                                              |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Susiloretni et al. (2021)    | The psychological distress of parents is associated with reduced linear growth of children: Evidence from a nationwide population survey                                               | No assessment of anxiety in fathers                                                                |
| Suzuki (1995)                | Familial and developmental antecedents of social anxiety                                                                                                                               | No assessment of anxiety in fathers                                                                |
| Swain et al. (2010)          | Parental brain function and structure: Effects of early life experience, contemporaneous breastfeeding, correlations with behavior and changes in the early postpartum                 | No assessment of anxiety in fathers                                                                |
| Swallow and Sennet (1969)    | Study of dentally anxious children using the acnaatrtie differential test                                                                                                              | Duplicate                                                                                          |
| Swallow and Sermet (1969)    | A study of dentally anxious children using the semantic differential test                                                                                                              | No assessment of anxiety in fathers                                                                |
| Szalai et al. (2017)         | Parental attachment and body satisfaction in adolescents                                                                                                                               | No assessment of anxiety in fathers                                                                |
| Szczygiel (2020)             | When does math anxiety in parents and teachers predict math anxiety and math achievement in elementary school children? The role of gender and grade year                              | No assessment of anxiety in fathers                                                                |
| Tahaney et al. (2013)        | The effect of trauma on risk of PTSD is modified by parental psychopathology                                                                                                           | No assessment of anxiety in fathers                                                                |
| Tambelli et al. (2020)       | Predictive and Incremental Validity of Parental Representations During Pregnancy on Child Attachment                                                                                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Tambelli et al. (2015)       | Early maternal relational traumatic experiences and psychopathological symptoms: a longitudinal study on mother-infant and father-infant interactions                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Tambs and Moum (1993)        | Low genetic effect and age-specific family effect for symptoms of anxiety and depression in nuclear families, halfsibs and twins                                                       | No assessment of anxiety in fathers                                                                |
| Tandon et al. (2014)         | Parental Warmth and Risks of Substance Use in Children with Attention-Deficit/Hyperactivity Disorder: Findings from a 10-12 Year Longitudinal Investigation                            | No assessment of anxiety in fathers                                                                |
| Tandon et al. (2021)         | Examining the Effectiveness of the Fathers and Babies Intervention: A Pilot Study                                                                                                      | No quantitative emotional/behavioural offspring outcomes                                           |
| Tang (1997)                  | Psychological impact of wife abuse. (Experiences of Chinese women and their children)                                                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Tanii and Uechi (1993)       | Parental Role Assessment Scale based on the self-rating of the parents of junior or senior high school students                                                                        | No assessment of anxiety in fathers                                                                |
| Tanii and Uechi (1994)       | Relationship between school adjustment of high school students and parental role behavior based on the self-rating of their parents                                                    | No assessment of anxiety in fathers                                                                |
| Tashman (1997)               | The parent-child study: Cognitive style, psychopathology, personality dysfunction, and parent-child relations in the parents of children at high and low cognitive risk for depression | No assessment of anxiety in fathers                                                                |
| Teichman and Ziv (1994)      | Characteristics of extended family and childrens trait anxiety                                                                                                                         | No assessment of anxiety in fathers                                                                |
| Telman et al. (2018)         | What are the odds of anxiety disorders running in families? A family study of anxiety disorders in mothers, fathers, and siblings of children with anxiety disorders                   | No quantitative emotional/behavioural offspring outcomes                                           |
| Teramoto et al. (2005)       | Problematic behaviours of 3-year-old children in Japan: Relationship with socioeconomic and family backgrounds                                                                         | No assessment of anxiety in fathers                                                                |
| Thome and Skuladottir (2005) | Evaluating a family-centred intervention for infant sleep problems                                                                                                                     | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Thompson et al. (2009)       | Brief report: Prediction of childrens preoperative anxiety by mothers and fathers                                                                                                      | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                  | Title                                                                                                                                                                                            | Reasons for exclusion                                                                              |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Thorgaard (2017)               | Health anxiety and illness behaviour in children of mothers with severe health anxiety                                                                                                           | No assessment of anxiety in fathers                                                                |
| Thorsteinsdottir et al. (2018) | Weight status and disordered sleep in preschool children, parents' negative mood states and marital status                                                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| Thorup et al. (2020)           | Mental health and somatic status of young children (0-6 years) born to parents with severe mental illnesses-a nationwide danish register study                                                   | No assessment of anxiety in fathers                                                                |
| Tisot (2004)                   | Environmental contributions to empathy development in young children                                                                                                                             | No quantitative emotional/behavioural offspring outcomes                                           |
| Tluczek et al. (2012)          | Impact of newborn screening and mediating factors on parent/infant relationships                                                                                                                 | No quantitative emotional/behavioural offspring outcomes                                           |
| Tobin (2000)                   | Adolescent suicide attempters in the year following hospitalization: Does the parent-child relationship predict symptom relapse and recurrent suicidality?                                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Tommerup and Lacey (2021)      | Maternal and paternal distress in early childhood and child adiposity trajectories: Evidence from the millennium cohort study                                                                    | No quantitative emotional/behavioural offspring outcomes                                           |
| Tommiska et al. (2002)         | Parental stress in families of 2 year old extremely low birthweight infants                                                                                                                      | No assessment of anxiety in fathers                                                                |
| Topolski et al. (1999)         | Genetic and environmental influences on ratings of manifest anxiety by parents and children                                                                                                      | No assessment of anxiety in fathers                                                                |
| Traklyali et al. (2009)        | Anxiety among adolescents and its affect on orthodontic compliance                                                                                                                               | No assessment of anxiety in fathers                                                                |
| Trepat et al. (2014)           | Parenting practices as mediating variables between parents' psychopathology and oppositional defiant disorder in preschoolers                                                                    | No assessment of anxiety in fathers                                                                |
| Tripkovic et al. (2013)        | Family factors associated with auto-aggressiveness in adolescents in Croatia                                                                                                                     | No assessment of anxiety in fathers                                                                |
| Trumble et al. (2016)          | The impact of a natural disaster on physical and mental health: Offspring morbidity and crop loss as mediators of paternal testosterone, cortisol, and depression among Bolivian forager-farmers | No assessment of anxiety in fathers                                                                |
| Trumello et al. (2021)         | COVID-19 and home confinement: A study on fathers, father-child relationships and child adjustment                                                                                               | Duplicate                                                                                          |
| Trute (1995)                   | Gender differences in the psychological adjustment of parents of young, developmentally disabled children                                                                                        | No assessment of anxiety in fathers                                                                |
| Tsao et al. (2006)             | Parent and Child Anxiety Sensitivity: Relationship to Children's Experimental Pain Responsivity                                                                                                  | No assessment of anxiety in fathers                                                                |
| Tschan et al. (2015)           | Parenting behavior in families of female adolescents with nonsuicidal self-injury in comparison to a clinical and a nonclinical control group                                                    | No quantitative emotional/behavioural offspring outcomes                                           |
| Tu et al. (2017)               | Sleep and mental health: the moderating role of perceived adolescent-parent attachment                                                                                                           | No assessment of anxiety in fathers                                                                |
| Tuason (2000)                  | Do parents' levels of differentiation of self predict those of their children? A test of Bowen theory                                                                                            | No assessment of anxiety in fathers                                                                |
| Tuovinen et al. (2021)         | Maternal antenatal stress and mental and behavioral disorders in their children                                                                                                                  | No assessment of anxiety in fathers                                                                |
| Turner (2008)                  | Impact of parental depression on child adjustment and protection afforded by child temperament                                                                                                   | No assessment of anxiety in fathers                                                                |
| Ulrich et al. (2011)           | Familial transmission of depression. The importance of harm avoidance                                                                                                                            | No assessment of anxiety in fathers                                                                |
| Umeda and Kawakami (2012)      | Association of childhood family environments with the risk of social withdrawal ('hikikomori') in the community population in Japan                                                              | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                   | Title                                                                                                                                            | Reasons for exclusion                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Vaage et al. (2011)             | Paternal predictors of the mental health of children of Vietnamese refugees                                                                      | No assessment of anxiety in fathers                                                                |
| van Beijsterveldt et al. (2004) | The Genetic Basis of Problem Behavior in 5-Year-Old Dutch Twin Pairs                                                                             | No assessment of anxiety in fathers                                                                |
| van den Oord et al. (2000)      | A study of genetic and environmental effects on the co-occurrence of problem behaviors in three-year-old twins                                   | No assessment of anxiety in fathers                                                                |
| van der Bruggen et al. (2010)   | What influences parental controlling behaviour? The role of parent and child trait anxiety                                                       | No assessment of anxiety in fathers                                                                |
| van der Bruggen et al. (2010)   | Parenting Behaviour as a Mediator between Young Children's Negative Emotionality and their Anxiety/Depression                                    | No assessment of anxiety in fathers                                                                |
| van der Sluis et al. (2015)     | Parenting and Children's Internalizing Symptoms: How Important are Parents?                                                                      | No assessment of anxiety in fathers                                                                |
| van Gampelaere et al. (2019)    | Families with pediatric type 1 diabetes: A comparison with the general population on child well-being, parental distress and parenting behavior  | No quantitative emotional/behavioural offspring outcomes                                           |
| van Gampelaere et al. (2020)    | Families with pediatric type 1 diabetes: A comparison with the general population on child well-being, parental distress, and parenting behavior | Duplicate                                                                                          |
| van Gastel et al. (2009)        | The role of perceived parenting in familial aggregation of anxiety disorders in children                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| van Hulle et al. (2018)         | Parent-offspring transmission of internalizing and sensory over-responsivity symptoms in adolescence                                             | No assessment of anxiety in fathers                                                                |
| van Voorst et al. (2004)        | Psychiatric disorders in children and family stress                                                                                              | No assessment of anxiety in fathers                                                                |
| Vanbinst et al. (2020)          | Mathematics Anxiety: An Intergenerational Approach                                                                                               | No assessment of anxiety in fathers                                                                |
| Varela et al. (2008)            | Anxiety symptoms and fears in Hispanic and European American children: Cross-cultural measurement equivalence                                    | No assessment of anxiety in fathers                                                                |
| Varela et al. (2009)            | Parenting strategies and socio-cultural influences in childhood anxiety: Mexican, Latin American descent, and European American families         | No assessment of anxiety in fathers                                                                |
| Varela et al. (2013)            | Parenting practices, interpretive biases, and anxiety in Latino children                                                                         | No assessment of anxiety in fathers                                                                |
| Varni and Setoguchi (1993)      | Effects of parental adjustment on the adaptation of children with congenital or acquired limb deficiencies                                       | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Vazsonyi and Belliston (2006)   | The Cultural and Developmental Significance of Parenting Processes in Adolescent Anxiety and Depression Symptoms                                 | No assessment of anxiety in fathers                                                                |
| Velandia (2022)                 | Parent-infant skin-to-skin contact studies                                                                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| Ventura (1982)                  | Parent coping behaviors, parent functioning, and infant temperament characteristics                                                              | No assessment of anxiety in fathers                                                                |
| Verhoeven et al. (2012)         | Unique Roles of Mothering and Fathering in Child Anxiety; Moderation by Child's Age and Gender                                                   | No assessment of anxiety in fathers                                                                |
| Verhulst (2013)                 | Using large-scale longitudinal cohorts to unravel etiologic mechanisms                                                                           | No assessment of anxiety in fathers                                                                |
| Vidair et al. (2011)            | Screening parents during child evaluations: Exploring parent and child psychopathology in the same clinic                                        | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Vieira et al. (2012)            | Attachment and parenting: The mediating role of work-family balance in Portuguese parents of preschool children                                  | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                      | Title                                                                                                                                                  | Reasons for exclusion                                                                              |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Vilaplana-Perez et al. (2019)      | P.196 Association of social anxiety disorder with objective indicators of educational attainment: A nationwide register-based sibling control study    | No assessment of anxiety in fathers                                                                |
| Vittachi (1979)                    | Let's make it two                                                                                                                                      | No assessment of anxiety in fathers                                                                |
| von Klitzing and Burgin (1993)     | Effect of psychological factors in pregnancy on development of the parent-child relationship. 1: Basic considerations on the course of pregnancy       | No quantitative emotional/behavioural offspring outcomes                                           |
| Vukovich et al. (2020)             | The impact of paternal caregiver factors on family functioning and youth adjustment in war-affected families                                           | No assessment of anxiety in fathers                                                                |
| Wade et al. (2001)                 | Investigation of quality of the parental relationship as a risk factor for subclinical bulimia nervosa                                                 | No assessment of anxiety in fathers                                                                |
| Waldbaum (1975)                    | First time expectant fathers: The effects of childbirth classes on their fears and anxieties                                                           | No quantitative emotional/behavioural offspring outcomes                                           |
| Walden et al. (2021)               | Internalizing behavior and inhibition/activation sensitivity in mauritian youth with and without a parental history of drinking problems               | No assessment of anxiety in fathers                                                                |
| Walker and Greene (1989)           | Children with recurrent abdominal pain and their parents: More somatic complaints, anxiety, and depression than other patient families?                | No quantitative emotional/behavioural offspring outcomes                                           |
| Walker et al. (2020)               | The Long-Term Impact of Maternal Anxiety and Depression Postpartum and in Early Childhood on Child and Paternal Mental Health at 11-12 Years Follow-Up | No assessment of anxiety in fathers                                                                |
| Wang (2001)                        | Toddlers' compliance to fathers: An examination of infant and contextual characteristics                                                               | No assessment of anxiety in fathers                                                                |
| Wang et al. (2016)                 | Attachment, coping, and adolescent adjustment problems: Examining three competing mediation models                                                     | No assessment of anxiety in fathers                                                                |
| Wang et al. (2021)                 | Parental and job burnout in a chinese sample                                                                                                           | No assessment of anxiety in fathers                                                                |
| Wang et al. (2021)                 | Parental Anxiety and Depression Moderate Intergenerational Transmission of Parental Psychological Aggression in China                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Wang et al. (2021)                 | Parental and job burnout in a Chinese sample                                                                                                           | Duplicate                                                                                          |
| Webb et al. (2017)                 | The Inter-relationship of Adolescent Unhappiness and Parental Mental Distress                                                                          | No assessment of anxiety in fathers                                                                |
| Wei et al. (2014)                  | Parenting behaviors and anxious self-talk in youth and parents                                                                                         | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Weissman (2010)                    | Improving the outcomes for depressed patients and their children                                                                                       | No quantitative emotional/behavioural offspring outcomes                                           |
| Weitkamp and Seiffge-Krenke (2019) | The Association Between Parental Rearing Dimensions and Adolescent Psychopathology: A Cross-Cultural Study                                             | No assessment of anxiety in fathers                                                                |
| Wesseldijk et al. (2018)           | Do Parental Psychiatric Symptoms Predict Outcome in Children With Psychiatric Disorders? A Naturalistic Clinical Study                                 | No assessment of anxiety in fathers                                                                |
| Westrupp et al. (2021)             | Child, parent, and family mental health and functioning in Australia during COVID-19: comparison to pre-pandemic data                                  | Duplicate                                                                                          |
| Whiteside-Mansell (1996)           | Factor invariance of a measure of parental emotional investment in children within couples                                                             | No quantitative emotional/behavioural offspring outcomes                                           |
| Whiteside-Mansell et al. (2001)    | Similarities and differences in parental investment for mothers and fathers                                                                            | No assessment of anxiety in fathers                                                                |
| Whitley et al. (2011)              | Association of maternal and paternal IQ with offspring conduct, emotional, and attention problem scores:                                               | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)                 | Title                                                                                                                                                                                              | Reasons for exclusion                                                                              |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|                               | Transgenerational evidence from the 1958 British birth cohort study                                                                                                                                |                                                                                                    |
| Wilhelm et al. (1999)         | Psychological predictors of single and recurrent major depressive episodes                                                                                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Wille (1998)                  | Longitudinal analysis of mothers' and fathers' responses on the maternal separation anxiety scale                                                                                                  | No assessment of anxiety in fathers                                                                |
| Williams (1998)               | The effects of a parent training program on parents and children who are enrolled in an early intervention program                                                                                 | No assessment of anxiety in fathers                                                                |
| Williams (2010)               | Help-seeking, service use, and unmet health and mental health need among sexual minority youth: Findings from add health, a national school-based study                                            | No assessment of anxiety in fathers                                                                |
| Williams and Burnfield (2019) | Psychological difficulties and parental well-being in children with musculoskeletal problems in the 2011/2012 National Survey of Children's Health                                                 | No assessment of anxiety in fathers                                                                |
| Williams and Kennedy (2012)   | Bullying behaviors and attachment styles                                                                                                                                                           | No assessment of anxiety in fathers                                                                |
| Willis and Clark (2009)       | Papa was a rolling stone and I am too: Paternal caregiving and its influence on the sexual behavior of low-income African American men                                                             | No assessment of anxiety in fathers                                                                |
| Wilson et al. (2013)          | A confirmatory bifactor analysis of the inventory of interpersonal problems-circumplex and associations of interpersonal traits across multiple relationship contexts and measures                 | No assessment of anxiety in fathers                                                                |
| Wolf and Smith (1956)         | The role of the pediatrician in the mental health of children                                                                                                                                      | No assessment of anxiety in fathers                                                                |
| Wolman (1957)                 | Explorations in latent schizophrenia                                                                                                                                                               | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Wong et al. (2014)            | A case control study of adolescent suicide attempters in Singapore-family and social connectivity and risk predisposition                                                                          | No assessment of anxiety in fathers                                                                |
| Woolfolk (2019)               | Happily arguing: The role of parental positive emotions during interparental conflict on child functioning                                                                                         | No assessment of anxiety in fathers                                                                |
| Wynter et al. (2016)          | Factors associated with father-to-infant attachment at 6 months postpartum: a community-based study in Victoria, Australia                                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Wynter et al. (2020)          | Factors associated with poor father-to-infant attachment at 6 months postpartum: A community study in Victoria, Australia                                                                          | No quantitative emotional/behavioural offspring outcomes                                           |
| Yamazaki (1973)               | A study of school phobia: II. Family dynamics that obstruct socialization of chronic cases with main reference to the personalities of the fathers                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Yanni (1982)                  | Perception of parents' behavior and children's general fearfulness                                                                                                                                 | No assessment of anxiety in fathers                                                                |
| Yehuda (2013)                 | Epigenetic markers in the GR and FKBP5 genes in children of holocaust survivors                                                                                                                    | No quantitative emotional/behavioural offspring outcomes                                           |
| Yumoto (2008)                 | Attachment representation in inner-city African American adolescents                                                                                                                               | No assessment of anxiety in fathers                                                                |
| Yuncu et al. (2009)           | Psychopathology and temperament in parents of adolescents with substance use disorders: a controlled study                                                                                         | No quantitative emotional/behavioural offspring outcomes                                           |
| Zaidman-Zait and Hall (2019)  | Contributions of parents' reports of children's sleep and challenging family contexts at age five to teachers' reports of children's classroom engagement and academic achievement two years later | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)             | Title                                                                                                                                                    | Reasons for exclusion                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Zaky et al. (2016)        | Psychosocial profile of encopretic children and their caregivers in relation to parenting style                                                          | No quantitative emotional/behavioural offspring outcomes                                           |
| Zalihic et al. (2008)     | Influence of posttraumatic stress disorder of the fathers on other family members                                                                        | No assessment of anxiety in fathers                                                                |
| Zelkowitz et al. (2007)   | Anxiety affects the relationship between parents and their very low birth weight infants                                                                 | Exclusive focus on populations with specific health problems or a diagnosed developmental disorder |
| Zemore and Rinholm (1989) | Vulnerability to depression as a function of parental rejection and control                                                                              | No assessment of anxiety in fathers                                                                |
| Zerach and Solomon (2016) | Low levels of posttraumatic stress symptoms and psychiatric symptomatology among third-generation Holocaust survivors whose fathers were war veterans    | No assessment of anxiety in fathers                                                                |
| Zerach and Solomon (2016) | A Relational Model for the Intergenerational Transmission of Captivity Trauma: A 23-Year Longitudinal Study                                              | No assessment of anxiety in fathers                                                                |
| Zerach and Solomon (2016) | Indirect Exposure to Captivity Details Is Not Related to Posttraumatic Stress Symptoms Among the Spouses and Offspring of Former Prisoners of War        | No assessment of anxiety in fathers                                                                |
| Zerach and Solomon (2018) | Gender differences in posttraumatic stress symptoms among former prisoners of wars' adult offspring                                                      | No assessment of anxiety in fathers                                                                |
| Zerach et al. (2012)      | The relationship between posttraumatic stress disorder symptoms and paternal parenting of adult children among ex-prisoners of war: a longitudinal study | No assessment of anxiety in fathers                                                                |
| Zerach et al. (2016)      | The role of fathers' psychopathology in the intergenerational transmission of captivity trauma: A twenty three-year longitudinal study                   | No assessment of anxiety in fathers                                                                |
| Zerach et al. (2017)      | Intergenerational transmission of captivity trauma and posttraumatic stress symptoms: A twenty three-year longitudinal triadic study                     | No assessment of anxiety in fathers                                                                |
| Zhang et al. (2008)       | A longitudinal study of parent-child relationships and problem behaviors in early childhood: Transactional model                                         | No assessment of anxiety in fathers                                                                |
| Zhang et al. (2012)       | Attachment of children with childhood schizophrenia and related factors                                                                                  | No quantitative emotional/behavioural offspring outcomes                                           |
| Zhang et al. (2021)       | Emotion Regulation Difficulties in Military Fathers Magnify Their Benefit from a Parenting Program                                                       | No assessment of anxiety in fathers                                                                |
| Zhang et al. (2021)       | Mental Health Issues among Caregivers of Young Children in Rural China: Prevalence, Risk Factors, and Links to Child Developmental Outcomes              | No quantitative emotional/behavioural offspring outcomes                                           |
| Zhao (2013)               | Relationships among romantic attachment, parent-child attachment and children's anxiety                                                                  | No assessment of anxiety in fathers                                                                |
| Zhao and Zhu (2011)       | Relationship between parent-child attachment and children's anxiety                                                                                      | No assessment of anxiety in fathers                                                                |
| Zhao et al. (2022)        | The association between family function and sleep disturbances of preschool children in rural areas of China: a cross-sectional study                    | Duplicate                                                                                          |
| Zheng et al. (2014)       | Research on the Relationship Between Father's Rearing Style and Children's Social Development                                                            | No assessment of anxiety in fathers                                                                |
| Zhou and Li (2021)        | Maternal and paternal worry, anxious rearing behaviors, and child anxiety during the preschool years                                                     | Duplicate                                                                                          |
| Zhou and Li (2021)        | Maternal and Paternal Worry, Anxious Rearing Behaviors, and Child Anxiety During the Preschool Years                                                     | No assessment of anxiety in fathers                                                                |
| Zhou et al. (2017)        | Couple Forgiveness and its Moderating Role in the Intergenerational Transmission of Veterans' Posttraumatic Stress Symptoms                              | No assessment of anxiety in fathers                                                                |

## Appendix C

| Author (year)      | Title                                                                                                             | Reasons for exclusion               |
|--------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Zhou et al. (2017) | The effects of NR3C1 polymorphisms and paternal/maternal parenting styles on Chinese adolescent anxiety disorders | No assessment of anxiety in fathers |

Table C2 Records that Met the Inclusion Criteria, but Data Were Not Available

| Author (year)                 | Title                                                                                                                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alpaslan et al. (2015)        | Investigation of specific familial transmission characteristics in social phobia                                                                                   |
| Alvarenga et al. (2015)       | Obsessive-compulsive symptom dimensions in a population-based, cross-sectional sample of school-aged children                                                      |
| Banez and Compas (1990)       | Children's and parents' daily stressful events and psychological symptoms                                                                                          |
| Barrett et al. (2005)         | Parent-child interactions with anxious children and with their siblings: An observational study                                                                    |
| Beato et al. (2016)           | The relationship between different parenting typologies in fathers and mothers and children's anxiety                                                              |
| Behrendt et al. (2012)        | The role of different mental disorders in mothers and fathers for offspring risk of substance use disorders                                                        |
| Ben-Ari et al. (2015)         | Parents' and peers' contribution to risky driving of male teen drivers                                                                                             |
| Bogels et al. (2008)          | Parental rearing as a function of parent's own, partner's, and child's anxiety status: Fathers make the difference                                                 |
| Bosco et al. (2003)           | The connections between adolescents' perceptions of parents, parental psychological symptoms, and adolescent functioning                                           |
| Brooker et al. (2014)         | Birth and adoptive parent anxiety symptoms moderate the link between infant attention control and internalizing problems in toddlerhood                            |
| Burke et al. (2013)           | The intergenerational transmission of social skills and psychosocial problems among parents and their young adult children                                         |
| Caraveo-Anduaga et al. (2005) | Psychopathology across three family generations: An epidemiological study in Mexico City                                                                           |
| Cho (2018)                    | Parental anxiety as an environmental context for anxiety symptom development in childhood                                                                          |
| Cimino et al. (2017)          | DNA Methylation at the DAT Promoter and Risk for Psychopathology: Intergenerational Transmission between School-Age Youths and Their Parents in a Community Sample |
| Cowan et al. (2019)           | Fathers' and mothers' attachment styles, couple conflict, parenting quality, and children's behavior problems: an intervention test of mediation                   |
| Cowan et al. (2022)           | TRUE Dads: The impact of a couples-based fatherhood intervention on family relationships, child outcomes, and economic self-sufficiency                            |
| De Barse et al. (2016)        | Are parents' anxiety and depression related to child fussy eating?                                                                                                 |
| de Bruijn et al. (2009)       | Sex differences in the relation between prenatal maternal emotional complaints and child outcome                                                                   |
| Dougherty et al. (2013)       | Preschool Anxiety Disorders: Comprehensive Assessment of Clinical, Demographic, Temperamental, Familial, and Life Stress Correlates                                |
| Drogalis (2018)               | What about dads?---A latent and growth mixture modeling study of fathers' anger, anxiety, and depression                                                           |
| Finklestein et al. (2020)     | Adolescents' individual resilience and its association with security threats, anxiety and family resilience                                                        |

## Appendix C

| Author (year)                | Title                                                                                                                                                                                          |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Foley et al. (2004)          | Risks for conduct disorder symptoms associated with parental alcoholism in stepfather families versus intact families from a community sample                                                  |
| Golombok et al. (1995)       | Families created by the new reproductive technologies: quality of parenting and social and emotional development of the children                                                               |
| Herren et al. (2013)         | Beliefs regarding child anxiety and parenting competence in parents of children with separation anxiety disorder                                                                               |
| Hudson and Rapee (2005)      | Parental perceptions of overprotection: Specific to anxious children or shared between siblings?                                                                                               |
| Hughes et al. (2008)         | Family Functioning in Families of Children With Anxiety Disorders                                                                                                                              |
| Hughes et al. (2020)         | Parental well-being, couple relationship quality, and children's behavioral problems in the first 2 years of life                                                                              |
| Jelenova et al. (2016)       | Quality of life and parental styles assessed by adolescents suffering from inflammatory bowel diseases and their parents                                                                       |
| Johnson and Greenberg (2013) | Parenting and Early Adolescent Internalizing: The Importance of Teasing Apart Anxiety and Depressive Symptoms                                                                                  |
| Kim et al. (2015)            | A Prospective Longitudinal Study of Perceived Infant Outcomes at 18-24 Months: Neural and Psychological Correlates of Parental Thoughts and Actions Assessed during the First Month Postpartum |
| Koskela et al. (2020)        | The impact of parental psychopathology and sociodemographic factors in selective mutism - a nationwide population-based study                                                                  |
| Lam (2020)                   | The Roles of Parent-and-Child Mental Health and Parental Internet Addiction in Adolescent Internet Addiction: Does a Parent-and-Child Gender Match Matter?                                     |
| Laracuenta (2006)            | The relationship between parental depression and children's depression in a latino sample                                                                                                      |
| Laskey (2004)                | Parental Anxiety and Children's Anxiety: Associations with Parenting Behaviour and Beliefs and Modelling of Anxiety. A Questionnaire Study                                                     |
| Lavallee et al. (2019)       | Transgenerational improvements following child anxiety treatment: An exploratory examination                                                                                                   |
| Lee et al. (2011)            | Paternal psychosocial characteristics and corporal punishment of their 3-year-old children                                                                                                     |
| Maric and Bogels (2019)      | Parenting behaviors associated with youth AD diagnosis vs. youth ADHD diagnosis                                                                                                                |
| Matthewson et al. (2012)     | Does the parent-child relationship contribute to children's and parents' anxiety?                                                                                                              |
| McNeil et al. (2019)         | Transmission of dental fear from parent to adolescent in an Appalachian sample in the USA                                                                                                      |
| Meadows et al. (2007)        | Parental depression and anxiety and early childhood behavior problems across family types                                                                                                      |
| Moeini (2012)                | The relationship between fathers' mental disorder and their sons' mental disorder                                                                                                              |
| Mogil et al. (2021)          | A Trauma-Informed, Family-Centered, Virtual Home Visiting Program for Young Children: One-Year Outcomes                                                                                        |
| Muris et al. (2010)          | Mom told me scary things about this animal: parents installing fear beliefs in their children via the verbal information pathway                                                               |
| Pizzo et al. (2021)          | Parental Overprotection and Sleep Problems in Young Children                                                                                                                                   |
| Ralph et al. (1999)          | Parenting issues and behaviour problems of young children in a community sample                                                                                                                |
| Rimehaug et al. (2012)       | Change in self-reported emotional distress and parenting among parents referred to inpatient child psychiatric family treatment                                                                |
| Rork and Morris (2009)       | Influence of parenting factors on childhood social anxiety: Direct observation of parental warmth and control                                                                                  |

## Appendix C

| Author (year)             | Title                                                                                                                                                                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sahithya and Raman (2021) | Parenting Style, Parental Personality, and Child Temperament in Children with Anxiety Disorders-A Clinical Study from India                                                                                                         |
| Schlarb et al. (2013)     | Sleep problems among family members of a universal parent-training                                                                                                                                                                  |
| Sepulveda et al. (2021)   | Toward a Biological, Psychological and Familial Approach of Eating Disorders at Onset: Case-Control ANOBAS Study                                                                                                                    |
| Siqueland et al. (1996)   | Anxiety in children: Perceived family environments and observed family interaction                                                                                                                                                  |
| Solantaus et al. (2010)   | Preventive interventions in families with parental depression: children's psychosocial symptoms and prosocial behaviour                                                                                                             |
| Steinhausen et al. (2013) | Family aggregation and risk factors of obsessive-compulsive disorders in a nationwide three-generation study                                                                                                                        |
| Stepp et al. (2013)       | Unique influences of adolescent antecedents on adult borderline personality disorder features                                                                                                                                       |
| Xia et al. (2015)         | Comorbid anxiety and depression in school-aged children with attention deficit hyperactivity disorder (ADHD) and selfreported symptoms of ADHD, anxiety, and depression among parents of school-aged children with and without ADHD |
| Yim (1991)                | Children's conceptions of health and illness: Illness anxiety, general anxiety, and health locus-of-control in healthy and chronically ill children                                                                                 |
| Young (2019)              | Parent childhood abuse and neglect and offspring mental health: An examination of potential mediators                                                                                                                               |

Table C3 Records that Met the Inclusion Criteria, but Were Beyond the Focus of the Current Report

| Author (year)           | Title                                                                                                                                          |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Aktar et al. (2013)     | The interplay between expressed parental anxiety and infant behavioural inhibition predicts infant avoidance in a social referencing paradigm  |
| Aktar et al. (2014)     | Parental social anxiety disorder prospectively predicts toddlers' fear/avoidance in a social referencing paradigm                              |
| Aktar et al. (2017)     | How do parents' depression and anxiety, and infants' negative temperament relate to parent-infant face-to-face interactions?                   |
| Aktar et al. (2018)     | Parental Expressions of Anxiety and Child Temperament in Toddlerhood Jointly Predict Preschoolers' Avoidance of Novelty                        |
| Atella et al. (2003)    | More Than Meets the Eye: Parental and Infant Contributors to Maternal and Paternal Reports of Early Infant Difficultness                       |
| Babadagi et al. (2018)  | Associations Between Father Temperament, Character, Rearing, Psychopathology and Child Temperament in Children Aged 3-6 Years                  |
| Brooker et al. (2015)   | Associations Between Infant Negative Affect and Parent Anxiety Symptoms are Bidirectional: Evidence from Mothers and Fathers                   |
| Brooker et al. (2016)   | Early inherited risk for anxiety moderates the association between fathers' child-centered parenting and early social inhibition               |
| Cerniglia et al. (2014) | Mother-child and father-child interactions during feeding in a non referred sample: An empirical study on the parental psychopathological risk |
| Davé et al. (2005)      | The association of paternal mood and infant temperament: A pilot study                                                                         |
| de Vente et al. (2011)  | Intergenerational transmission of social anxiety: The role of paternal and maternal fear of negative child evaluation and parenting behaviour  |
| de Vente et al. (2020)  | Intergenerational transmission of anxiety: linking parental anxiety to infant autonomic hyperarousal and fearful temperament                   |

## Appendix C

| Author (year)                | Title                                                                                                                                                           |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Diener et al. (1995)         | The role of prenatal expectations in parents' reports of infant temperament                                                                                     |
| Duthu et al. (2008)          | Parental characteristics and their representation of child temperament: Influence of personality traits, psychiatric symptoms and family ecology                |
| Gibler et al. (2018)         | Paternal Anxiety in Relation to Toddler Anxiety: The Mediating Role of Maternal Behavior                                                                        |
| Kendler et al. (1997)        | The determinants of parenting: an epidemiological, multi-informant, retrospective study                                                                         |
| Kryski et al. (2018)         | Associations between observed temperament in preschoolers and parent psychopathology                                                                            |
| Lawrence et al. (2021)       | A longitudinal study of parental discipline up to 5 years                                                                                                       |
| Masseri et al. (2004)        | Anaesthesia induction in children: A psychological evaluation of the efficiency of parents' presence                                                            |
| Metz et al. (2018)           | Concurrent and Predictive Associations Between Infants' and Toddlers' Fearful Temperament, Coparenting, and Parental Anxiety Disorders                          |
| Moller et al. (2014)         | Fathers' versus mothers' social referencing signals in relation to infant anxiety and avoidance: a visual cliff experiment                                      |
| Moller et al. (2015)         | Parental Anxiety, Parenting Behavior, and Infant Anxiety: Differential Associations for Fathers and Mothers                                                     |
| Parfitt et al. (2014)        | A prospective study of the parent-baby bond in men and women 15 months after birth                                                                              |
| Prino et al. (2016)          | Parental Relationship with Twins from Pregnancy to 3 Months: The Relation Among Parenting Stress, Infant Temperament, and Well-Being                            |
| Ramchandani et al. (2006)    | Early parental and child predictors of recurrent abdominal pain at school age: Results of a large population-based study                                        |
| Sechi et al. (2020)          | First-Time Mothers' and Fathers' Developmental Changes in the Perception of Their Daughters' and Sons' Temperament: Its Association With Parents' Mental Health |
| Sirignano and Lachman (1985) | Personality change during the transition to parenthood: The role of perceived infant temperament                                                                |
| Torpey et al. (2013)         | Error-related brain activity in young children: associations with parental anxiety and child temperamental negative emotionality                                |
| Ventura and Stevenson (1986) | Relations of mothers' and fathers' reports of infant temperament, parents' psychological functioning, and family characteristics                                |

**Note.** The records in the table included only temperamental and/or observational offspring outcomes. This report focuses only on studies reporting emotional and/or behavioural offspring outcomes assessed via standardized measures; examining temperamental and observational outcomes was considered conceptually beyond our focus.

### C.3 Visual Representation of the Offspring Outcomes

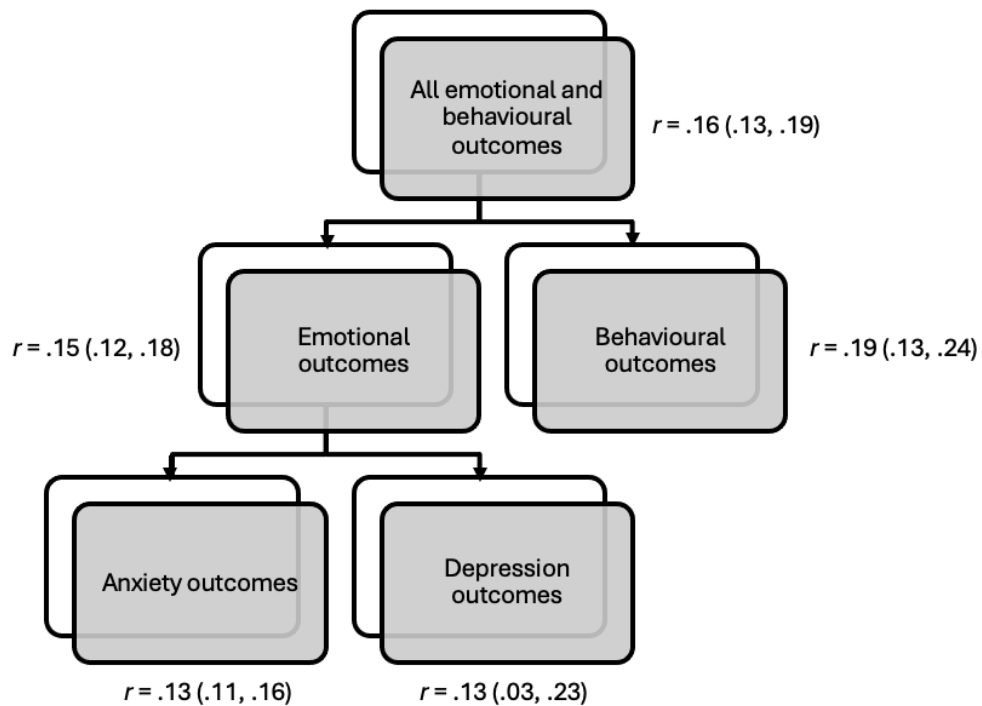


Figure C1 Visual Representation of the Offspring Outcomes and Their Associations with Paternal Anxiety, as Found in the Three-level Meta-analytic Models

*Note.* Effect sizes are correlation coefficients (95% CI). The five meta-analyses include outcomes that are partially overlapping: studies looking at depression and anxiety outcomes are also included in the meta-analysis looking emotional outcomes (which also includes a number of additional outcomes, such as obsessive compulsive disorder symptoms, posttraumatic stress disorder symptoms, and general internalising/emotional problems); the meta-analysis looking at all outcomes, besides the combined emotional and behavioural outcomes, also includes outcomes such as total difficulties, socioemotional difficulties, wellbeing (reverse-coded), self-efficacy (reverse-coded).

## C.4 Moderator Analyses

Table C4 Moderators of the Association Between Paternal Anxiety and All Emotional and Behavioural Offspring Outcomes

| Categorical moderators                      | <i>k</i> | <i>df</i> | <i>r</i> |     | 95% CI |      | <i>F</i> | <i>p</i> |
|---------------------------------------------|----------|-----------|----------|-----|--------|------|----------|----------|
|                                             |          |           |          |     | lb     | ub   |          |          |
| Paternal anxiety assessment                 |          |           |          |     |        |      | 3.18     | 0.08     |
| Diagnostic interview                        | 21       | 320       | 0.09     | *   | 0.01   | 0.17 |          |          |
| No diagnostic interview                     | 301      | 320       | 0.17     |     | -0.01  | 0.16 |          |          |
| Offspring assessment                        |          |           |          |     |        |      | 4.57     | 0.03     |
| Diagnostic interview                        | 24       | 320       | 0.09     | *   | 0.01   | 0.16 |          |          |
| No diagnostic interview                     | 298      | 320       | 0.17     | *   | 0.01   | 0.16 |          |          |
| Offspring outcome rater                     |          |           |          |     |        |      | 23.58    | < .0001  |
| Self-report <sup>a, b, c</sup>              | 111      | 316       | 0.15     | *** | 0.11   | 0.18 |          |          |
| Mother <sup>a, d, e</sup>                   | 69       | 316       | 0.11     |     | -0.08  | 0.01 |          |          |
| Father <sup>b, d, f, g</sup>                | 59       | 316       | 0.27     | *** | 0.08   | 0.18 |          |          |
| Parents <sup>c, e, f, h, i</sup>            | 55       | 316       | 0.20     | *   | 0.00   | 0.11 |          |          |
| Expert <sup>g, i</sup>                      | 15       | 316       | 0.07     |     | -0.18  | 0.03 |          |          |
| Other <sup>h</sup>                          | 13       | 316       | 0.13     |     | -0.10  | 0.07 |          |          |
| Biological relatedness                      |          |           |          |     |        |      | 0.60     | 0.62     |
| Yes                                         | 63       | 318       | 0.14     | *** | 0.09   | 0.19 |          |          |
| No                                          | 29       | 318       | 0.13     |     | -0.19  | 0.16 |          |          |
| Majority yes                                | 44       | 318       | 0.14     |     | -0.08  | 0.08 |          |          |
| Not stated                                  | 186      | 318       | 0.17     |     | -0.03  | 0.10 |          |          |
| Study location                              |          |           |          |     |        |      | 4.35     | 0.01     |
| Australia <sup>a</sup>                      | 13       | 318       | 0.21     | *** | 0.09   | 0.32 |          |          |
| Asia and Middle East <sup>b</sup>           | 27       | 318       | 0.23     |     | -0.12  | 0.16 |          |          |
| Canada and North America <sup>a, b, c</sup> | 200      | 318       | 0.10     |     | -0.24  | 0.02 |          |          |
| Europe <sup>c</sup>                         | 82       | 318       | 0.18     |     | -0.16  | 0.10 |          |          |
| Risk population                             |          |           |          |     |        |      | 0.17     | 0.85     |
| High-risk population                        | 17       | 319       | 0.18     | *** | 0.08   | 0.27 |          |          |
| Non-high risk                               | 284      | 319       | 0.16     |     | -0.12  | 0.08 |          |          |
| Mix                                         | 21       | 319       | 0.18     |     | -0.15  | 0.16 |          |          |
| Association type                            |          |           |          |     |        |      | 0.35     | 0.55     |
| Cross-sectional                             | 216      | 320       | 0.16     | *** | 0.13   | 0.19 |          |          |
| Prospective                                 | 106      | 320       | 0.15     |     | -0.04  | 0.02 |          |          |
| Continuous moderators                       | <i>k</i> | <i>df</i> | <i>r</i> |     | 95% CI |      | <i>F</i> | <i>p</i> |
|                                             |          |           |          |     | lb     | ub   |          |          |
| Intercept                                   |          | 305       | 0.11     | *** | 0.06   | 0.17 |          |          |

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|                             |     |     |       |     |       |      |      |      |
|-----------------------------|-----|-----|-------|-----|-------|------|------|------|
| Offspring age at assessment | 307 | 305 | 0.00  |     | 0.00  | 0.00 | 2.57 | 0.11 |
| <i>Intercept</i>            |     | 279 | 0.17  | *** | 0.12  | 0.22 |      |      |
| Offspring sex               | 281 | 279 | 0.00  |     | 0.00  | 0.00 | 0.83 | 0.36 |
| <i>Intercept</i>            |     | 320 | -0.98 |     | -1.00 | 1.00 |      |      |
| Year of publication         | 322 | 320 | 0.00  |     | 0.00  | 0.00 | 0.73 | 0.40 |
| <i>Intercept</i>            |     | 320 | 0.16  | *** | 0.13  | 0.19 |      |      |
| Time lag                    | 322 | 320 | 0.00  |     | -0.01 | 0.01 | 0.04 | 0.84 |

*Note.* <sup>a, b, c, d, e, f, g, h, i</sup> Within each significant moderator having more than 2 subgroups, identical superscript a, b, c, d, e, f, g, h, i indicates significant ( $p < .05$ ) pairwise comparisons between subgroups.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table C5 Moderators of the Association Between Paternal Anxiety and Behavioural Outcomes

| Categorical moderators                   | <i>k</i>       | <i>df</i> | <i>r</i> |     | 95% CI |       | <i>F</i> | <i>p</i> |
|------------------------------------------|----------------|-----------|----------|-----|--------|-------|----------|----------|
|                                          |                |           |          |     | lb     | ub    |          |          |
| Paternal anxiety assessment              |                |           |          |     |        |       | -        | -        |
| Diagnostic interview                     | 5              |           |          |     |        |       |          |          |
| No diagnostic interview                  | 74             |           |          |     |        |       |          |          |
| Offspring assessment                     |                |           |          |     |        |       | -        | -        |
| Diagnostic interview                     | 0              |           |          |     |        |       |          |          |
| No diagnostic interview                  | 79             |           |          |     |        |       |          |          |
| Offspring outcome rater                  |                |           |          |     |        |       | 10.76    | < .0001  |
| Self-report                              | 9 <sup>†</sup> |           |          |     |        |       |          |          |
| Mother <sup>a, b</sup>                   | 26             | 63        | 0.12     | *** | 0.06   | 0.17  |          |          |
| Father <sup>a</sup>                      | 21             | 63        | 0.26     | *** | 0.08   | 0.21  |          |          |
| Parents <sup>b</sup>                     | 19             | 63        | 0.23     | *   | 0.02   | 0.20  |          |          |
| Expert                                   | 0 <sup>†</sup> |           |          |     |        |       |          |          |
| Other                                    | 4 <sup>†</sup> |           |          |     |        |       |          |          |
| Biological relatedness                   |                |           |          |     |        |       | -        | -        |
| Yes                                      | 21             |           |          |     |        |       |          |          |
| No                                       | 1              |           |          |     |        |       |          |          |
| Majority yes                             | 3              |           |          |     |        |       |          |          |
| Not stated                               | 54             |           |          |     |        |       |          |          |
| Study location                           |                |           |          |     |        |       | 4.32     | 0.02     |
| Australia                                | 0 <sup>†</sup> |           |          |     |        |       |          |          |
| Asia and Middle East <sup>a</sup>        | 10             | 76        | 0.27     | *** | 0.16   | 0.36  |          |          |
| Canada and North America <sup>a, b</sup> | 46             | 76        | 0.10     | *   | -0.30  | -0.04 |          |          |
| Europe <sup>b</sup>                      | 23             | 76        | 0.22     |     | -0.18  | 0.08  |          |          |
| Risk population                          |                |           |          |     |        |       | -        | -        |
| High-risk population                     | 5              |           |          |     |        |       |          |          |

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|                  |    |    |      |     |       |      |      |      |
|------------------|----|----|------|-----|-------|------|------|------|
| Non-high risk    | 65 |    |      |     |       |      |      |      |
| Mix              | 9  |    |      |     |       |      |      |      |
| Association type |    |    |      |     |       |      | 0.54 | 0.47 |
| Cross-sectional  | 46 | 77 | 0.19 | *** | 0.14  | 0.25 |      |      |
| Prospective      | 33 | 77 | 0.17 |     | -0.10 | 0.05 |      |      |

| Continuous moderators       | <i>k</i> | <i>df</i> | <i>r</i> |     | 95% CI |       | <i>F</i> | <i>p</i> |
|-----------------------------|----------|-----------|----------|-----|--------|-------|----------|----------|
|                             |          |           |          |     | lb     | ub    |          |          |
| Intercept                   |          | 74        | 0.17     | **  | 0.07   | 0.26  |          |          |
| Offspring age at assessment | 76       | 74        | 0.00     |     | 0.00   | 0.00  | 0.24     | 0.63     |
| Intercept                   |          | 68        | 0.15     |     | -0.02  | 0.31  |          |          |
| Offspring sex               | 70       | 68        | 0.00     |     | 0.00   | 0.00  | 0.53     | 0.47     |
| Intercept                   |          | 77        | -1.00    | *   | -1.00  | -0.96 |          |          |
| Year of publication         | 79       | 77        | 0.01     | *   | 0.00   | 0.02  | 5.09     | 0.03     |
| Intercept                   |          | 77        | 0.19     | *** | 0.13   | 0.24  |          |          |
| Time lag                    | 79       | 77        | 0        |     | -0.01  | 0.01  | 0        | 1.00     |

Note. <sup>a, b</sup> Within each significant moderator having more than 2 subgroups, identical superscript a, b indicates significant ( $p < .05$ ) pairwise comparisons between subgroups.

† Subgroup not included in the analyses.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table C6 Moderators of the Association Between Paternal Anxiety and Emotional Outcomes

| Categorical moderators            | <i>k</i>       | <i>df</i> | <i>r</i> |     | 95% CI |      | <i>F</i> | <i>p</i> |
|-----------------------------------|----------------|-----------|----------|-----|--------|------|----------|----------|
|                                   |                |           |          |     | lb     | ub   |          |          |
| Paternal anxiety assessment       |                |           |          |     |        |      | 3.37     | 0.07     |
| Diagnostic interview              | 16             | 233       | 0.08     |     | -0.01  | 0.16 |          |          |
| No diagnostic interview           | 219            | 233       | 0.16     |     | -0.01  | 0.18 |          |          |
| Offspring assessment              |                |           |          |     |        |      | 4.90     | 0.03     |
| Diagnostic interview              | 24             | 233       | 0.08     | *   | 0.00   | 0.15 |          |          |
| No diagnostic interview           | 211            | 233       | 0.16     | *   | 0.01   | 0.16 |          |          |
| Offspring outcome rater           |                |           |          |     |        |      | 24.50    | < .0001  |
| Self-report <sup>a, b, c, d</sup> | 96             | 221       | 0.14     | *** | 0.11   | 0.18 |          |          |
| Mother <sup>a, e, f</sup>         | 43             | 221       | 0.10     |     | -0.10  | 0.00 |          |          |
| Father <sup>b, e, g, h</sup>      | 38             | 221       | 0.29     | *** | 0.10   | 0.20 |          |          |
| Parents <sup>c, f, g</sup>        | 34             | 221       | 0.20     |     | 0.00   | 0.12 |          |          |
| Expert <sup>d, h</sup>            | 15             | 221       | 0.06     |     | -0.19  | 0.02 |          |          |
| Other                             | 9 <sup>†</sup> |           |          |     |        |      |          |          |
| Biological relatedness            |                |           |          |     |        |      | 0.33     | 0.80     |
| Yes                               | 42             | 231       | 0.15     | *** | 0.09   | 0.21 |          |          |
| No                                | 28             | 231       | 0.13     |     | -0.24  | 0.19 |          |          |

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| Majority yes                | 40  | 231 | 0.13  |     | -0.11  | 0.07 |      |      |
|-----------------------------|-----|-----|-------|-----|--------|------|------|------|
| Not stated                  | 125 | 231 | 0.16  |     | -0.06  | 0.08 |      |      |
| Study location              |     |     |       |     |        |      | 2.62 | 0.05 |
| Australia                   | 13  | 231 | 0.21  | *** | 0.09   | 0.33 |      |      |
| Asia and Middle East        | 14  | 231 | 0.20  |     | -0.16  | 0.14 |      |      |
| Canada and North America    | 152 | 231 | 0.10  |     | -0.24  | 0.02 |      |      |
| Europe                      | 56  | 231 | 0.18  |     | -0.16  | 0.10 |      |      |
| Risk population             |     |     |       |     |        |      | 0.65 | 0.53 |
| High-risk population        | 10  | 232 | 0.15  | *   | 0.03   | 0.27 |      |      |
| Non-high risk               | 213 | 232 | 0.15  |     | -0.13  | 0.12 |      |      |
| Mix                         | 12  | 232 | 0.22  |     | -0.11  | 0.23 |      |      |
| Association type            |     |     |       |     |        |      | 0.18 | 0.67 |
| Cross-sectional             | 162 | 233 | 0.15  | *** | 0.12   | 0.19 |      |      |
| Prospective                 | 73  | 233 | 0.14  |     | -0.05  | 0.03 |      |      |
| Continuous moderators       | k   | df  | r     |     | 95% CI |      | F    | p    |
|                             |     |     |       |     | lb     | ub   |      |      |
| Intercept                   |     | 224 | 0.11  | **  | 0.04   | 0.17 |      |      |
| Offspring age at assessment | 226 | 224 | 0.00  |     | 0.00   | 0.00 | 1.45 | 0.23 |
| Intercept                   |     | 201 | 0.17  | *** | 0.11   | 0.22 |      |      |
| Offspring sex               | 203 | 201 | 0.00  |     | 0.00   | 0.00 | 0.88 | 0.35 |
| Intercept                   |     | 233 | -0.86 |     | -1.00  | 1.00 |      |      |
| Year of publication         | 235 | 233 | 0.00  |     | 0.00   | 0.00 | 0.21 | 0.64 |
| Intercept                   |     | 233 | 0.15  | *** | 0.12   | 0.18 |      |      |
| Time lag                    | 235 | 233 | 0.00  |     | -0.01  | 0.01 | 0.01 | 0.93 |

*Note.* <sup>a, b, c, d, e, f, g, h</sup> Within each significant moderator having more than 2 subgroups, identical superscript a, b, c, d, e, f, g, h indicates significant ( $p < .05$ ) pairwise comparisons between subgroups.

† Subgroup not included in the analyses.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table C7 Moderators of the Association Between Paternal Anxiety and Anxiety Outcomes

| Categorical moderators      | k   | df  | r    |    | 95% CI |      | F    | p    |
|-----------------------------|-----|-----|------|----|--------|------|------|------|
|                             |     |     |      |    | lb     | ub   |      |      |
| Paternal anxiety assessment |     |     |      |    |        |      | 1.92 | 0.17 |
| Diagnostic interview        | 10  | 122 | 0.08 |    | -0.01  | 0.16 |      |      |
| No diagnostic interview     | 114 | 122 | 0.14 |    | -0.03  | 0.16 |      |      |
| Offspring assessment        |     |     |      |    |        |      | 7.19 | 0.01 |
| Diagnostic interview        | 21  | 122 | 0.06 | *  | 0.01   | 0.12 |      |      |
| No diagnostic interview     | 103 | 122 | 0.15 | ** | 0.02   | 0.15 |      |      |

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|                                |                |     |      |     |       |       |       |         |
|--------------------------------|----------------|-----|------|-----|-------|-------|-------|---------|
| Offspring outcome rater        |                |     |      |     |       |       | 10.38 | < .0001 |
| Self-report <sup>a, b, c</sup> | 64             | 114 | 0.13 | *** | 0.10  | 0.17  |       |         |
| Mother <sup>a, d, e</sup>      | 15             | 114 | 0.01 | **  | -0.20 | -0.04 |       |         |
| Father <sup>b, d, f</sup>      | 14             | 114 | 0.25 | **  | 0.03  | 0.20  |       |         |
| Parents <sup>e</sup>           | 13             | 114 | 0.23 | *   | 0.02  | 0.18  |       |         |
| Expert <sup>c, f</sup>         | 13             | 114 | 0.06 |     | -0.16 | 0.01  |       |         |
| Other                          | 5 <sup>†</sup> |     |      |     |       |       |       |         |
| Biological relatedness         |                |     |      |     |       |       | 0.08  | 0.97    |
| Yes                            | 20             | 120 | 0.15 | *** | 0.08  | 0.21  |       |         |
| No                             | 16             | 120 | 0.14 |     | -0.14 | 0.14  |       |         |
| Majority yes                   | 21             | 120 | 0.12 |     | -0.12 | 0.08  |       |         |
| Not stated                     | 67             | 120 | 0.13 |     | -0.10 | 0.07  |       |         |
| Study location                 |                |     |      |     |       |       | 0.69  | 0.41    |
| Australia                      | 3 <sup>†</sup> |     |      |     |       |       |       |         |
| Asia and Middle East           | 6 <sup>†</sup> |     |      |     |       |       |       |         |
| Canada and North America       | 82             | 113 | 0.12 | *** | 0.08  | 0.15  |       |         |
| Europe                         | 33             | 113 | 0.14 |     | -0.04 | 0.09  |       |         |
| Risk population                |                |     |      |     |       |       | -     | -       |
| High-risk population           | 6              |     |      |     |       |       |       |         |
| Non-high risk                  | 115            |     |      |     |       |       |       |         |
| Mix                            | 3              |     |      |     |       |       |       |         |
| Association type               |                |     |      |     |       |       | 0.40  | 0.53    |
| Cross-sectional                | 100            | 122 | 0.14 | *** | 0.11  | 0.17  |       |         |
| Prospective                    | 24             | 122 | 0.12 |     | -0.09 | 0.04  |       |         |

| Continuous moderators       | <i>k</i> | <i>df</i> | <i>r</i> | 95% CI |      | <i>F</i> | <i>p</i> |
|-----------------------------|----------|-----------|----------|--------|------|----------|----------|
|                             |          |           |          | lb     | ub   |          |          |
| Intercept                   |          | 114       | 0.08     | 0.00   | 0.15 |          |          |
| Offspring age at assessment | 116      | 114       | 0.00     | 0.00   | 0.00 | 1.82     | 0.18     |
| Intercept                   |          | 103       | 0.16     | 0.09   | 0.22 |          |          |
| Offspring sex               | 105      | 103       | 0.00     | 0.00   | 0.00 | 1.05     | 0.31     |
| Intercept                   |          | 122       | 0.47     | -1.00  | 1.00 |          |          |
| Year of publication         | 124      | 122       | 0.00     | 0.00   | 0.00 | 0.02     | 0.88     |
| Intercept                   |          | 122       | 0.14     | 0.11   | 0.17 |          |          |
| Time lag                    | 124      | 122       | 0.00     | -0.01  | 0.01 | 0.15     | 0.70     |

**Note.** <sup>a, b, c, d, e, f</sup> Within each significant moderator having more than 2 subgroups, identical superscript a, b, c, d, e, f indicates significant ( $p < .05$ ) pairwise comparisons between subgroups.

† Subgroup not included in the analyses.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

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Table C8 Moderators of the Association Between Paternal Anxiety and Depression Outcomes

| Continuous moderators       | <i>k</i> | <i>df</i> | <i>r</i> | 95% CI |      | <i>F</i> | <i>p</i> |      |
|-----------------------------|----------|-----------|----------|--------|------|----------|----------|------|
|                             |          |           |          | lb     | ub   |          |          |      |
| <i>Intercept</i>            |          | 19        | 0.11     | -0.14  | 0.34 |          |          |      |
| Offspring age at assessment | 21       | 19        | 0.00     | 0.00   | 0.00 | 0.09     | 0.77     |      |
| <i>Intercept</i>            |          | 19        | 0.01     | -0.13  | 0.16 |          |          |      |
| Offspring sex               | 21       | 19        | 0.00     | *      | 0.00 | 0.00     | 7.12     | 0.02 |
| <i>Intercept</i>            |          | 19        | -1.00    | -1.00  | 1.00 |          |          |      |
| Year of publication         | 21       | 19        | 0.00     | -0.02  | 0.03 | 0.18     | 0.67     |      |
| <i>Intercept</i>            |          | 19        | 0.14     | *      | 0.04 | 0.24     |          |      |
| Time lag                    | 21       | 19        | -0.02    | -0.08  | 0.04 | 0.38     | 0.55     |      |

Note. \* $p < .05$ .

## C.5 Publication Bias Assessment

### C.5.1 The Association Between Paternal Anxiety and All Emotional and Behavioural Offspring Outcomes

The visual inspection of the funnel plot (see Figure C2) indicated asymmetry and the results of the pseudo-Egger test were significant ( $F_{1,320} = 7.79$ ,  $p = .006$ ; see Table C9), corroborating the presence of small-study effects, possibly caused by publication bias.

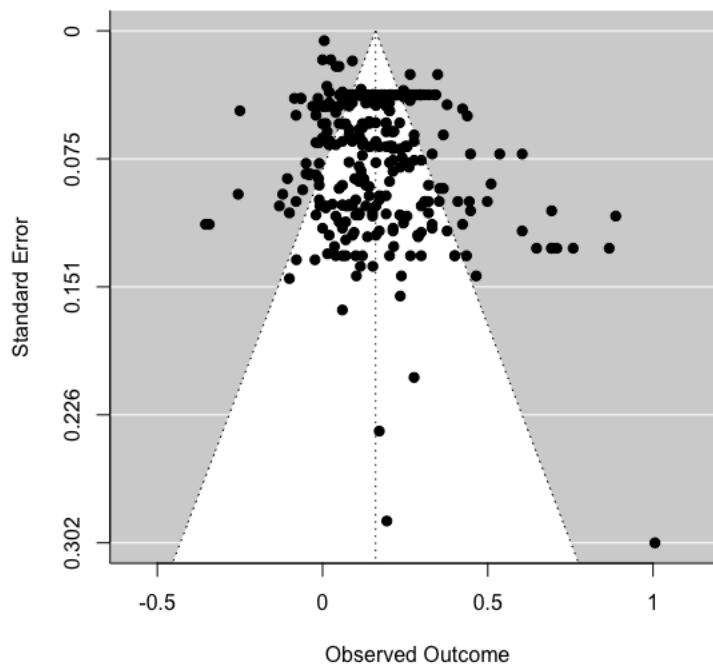


Figure C2 Funnel Plot for Overall Emotional and Behavioural Offspring Outcomes

Table C9 Pseudo-Egger Test for Emotional and Behavioural Offspring Outcomes

|                          | Estimate | 95% CI       | <i>t</i> | <i>p</i> | $F_{1,320}$ |
|--------------------------|----------|--------------|----------|----------|-------------|
| Risk of bias             |          |              |          |          | 7.79        |
| Intercept                | 0.08     | 0.01 to 0.14 | 2.21     | .03      |             |
| Standard-error of effect | 1.06     | 0.31 to 1.81 | 2.79     | .01      |             |

### C.5.2 The Association Between Paternal Anxiety and Offspring Behavioural Outcomes

The funnel plot (see Figure C3) indicated asymmetry and the results of the pseudo-Egger test were significant ( $F_{1,77} = 5.44, p = .02$ ; see Table C10), corroborating the presence of small-study effects, possibly caused by publication bias.

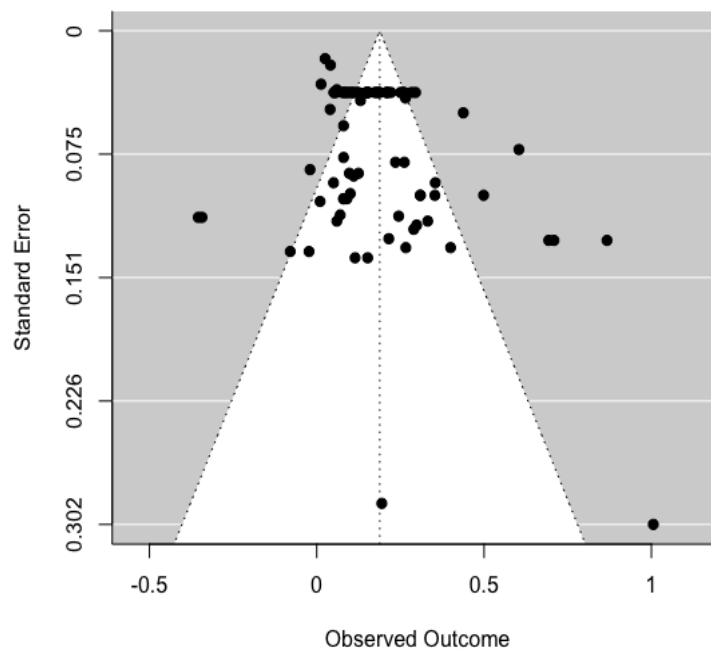


Figure C3 Funnel Plot for Behavioural Offspring Outcomes

Table C10 Pseudo-Egger Test for Behavioural Offspring Outcomes

|                          | Estimate | 95% CI        | t    | p   | $F_{1,77}$ |
|--------------------------|----------|---------------|------|-----|------------|
| Risk of bias             |          |               |      |     | 5.44       |
| Intercept                | 0.06     | -0.06 to 0.18 | 1.06 | .29 |            |
| Standard-error of effect | 1.47     | 0.22 to 2.73  | 2.33 | .02 |            |

### C.5.3 The Association Between Paternal Anxiety and Offspring Emotional Outcomes

The funnel plot (see Figure C4) indicated asymmetry and the results of the pseudo-Egger test were significant ( $F_{1,233} = 4.54, p = .03$ ; see Table C11), corroborating the presence of small-study effects and potential publication bias.

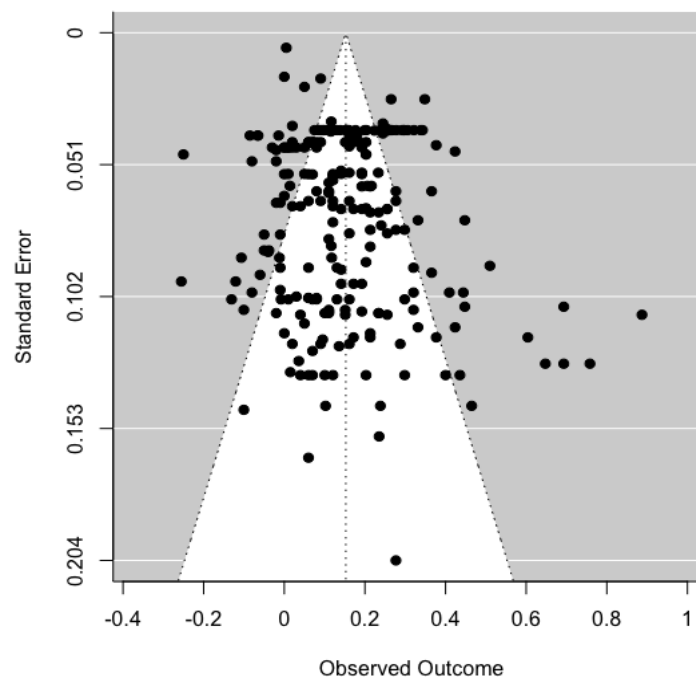


Figure C4 Funnel Plot for Emotional Offspring Outcomes

Table C11 Pseudo-Egger Test for Emotional Offspring Outcomes

|                          | Estimate | 95% CI       | <i>t</i> | <i>p</i> | <i>F</i> <sub>1,233</sub> |
|--------------------------|----------|--------------|----------|----------|---------------------------|
| Risk of bias             |          |              |          |          | 4.54                      |
| Intercept                | 0.08     | 0.00 to 0.15 | 2.04     | .04      |                           |
| Standard-error of effect | 0.95     | 0.07 to 1.83 | 2.13     | .03      |                           |

### C.5.4 The Association Between Paternal Anxiety and Offspring Anxiety

The funnel plot (see Figure C5) did not indicate asymmetry and the results of the pseudo-Egger test were nonsignificant ( $F_{1,122} = 2.07$ ,  $p = 0.15$ ; see Table C12), suggesting absence of publication bias.

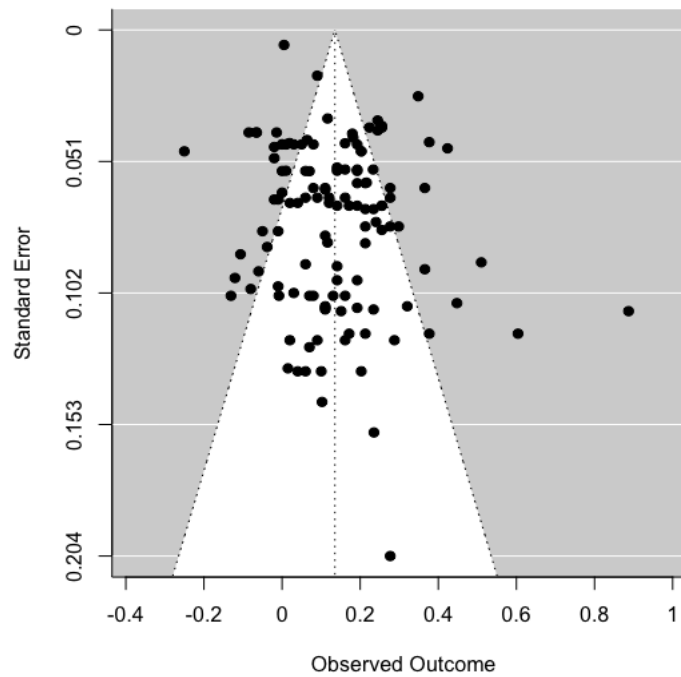


Figure C5 Funnel Plot for Anxiety Outcomes

Table C12 Pseudo-Egger Test for Anxiety Outcomes

|                          | Estimate | 95% CI        | <i>t</i> | <i>p</i> | $F_{1,122}$ |
|--------------------------|----------|---------------|----------|----------|-------------|
| Risk of bias             |          |               |          |          | 2.07        |
| Intercept                | 0.09     | 0.02 to 0.16  | 2.65     | .01      |             |
| Standard-error of effect | 0.64     | -0.24 to 1.53 | 1.44     | .15      |             |

### C.5.5 The Association Between Paternal Anxiety and Offspring Depression

The funnel plot (see Figure C6) did show some asymmetries, but the results of the pseudo-Egger test were nonsignificant ( $F_{1,19} = 3.29$ ,  $p = 0.09$ ; see Table C13), suggesting absence of publication bias.

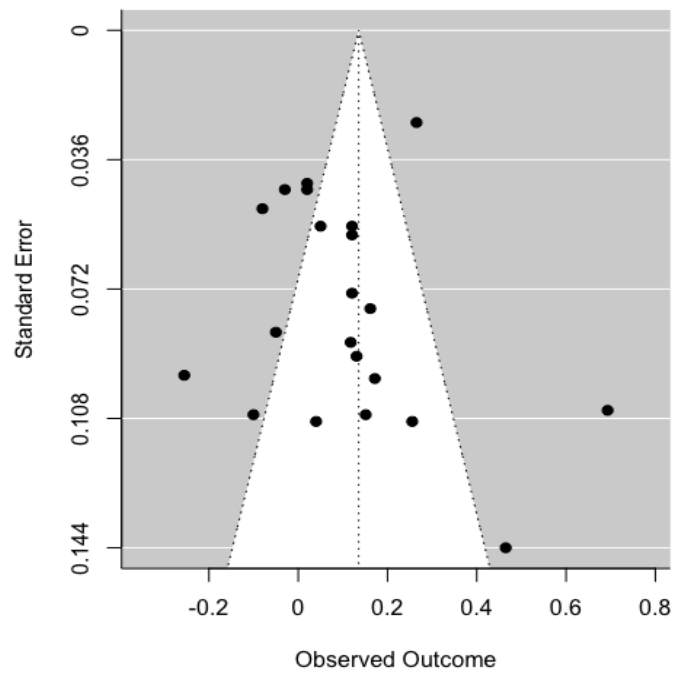


Figure C6 Funnel Plot for Depression Outcomes

Table C13 Pseudo-Egger Test for Depression Outcomes

|                          | Estimate | 95% CI        | <i>t</i> | <i>p</i> | $F_{1,19}$ |
|--------------------------|----------|---------------|----------|----------|------------|
| Risk of bias             |          |               |          |          | 3.29       |
| Intercept                | -0.06    | -0.32 to 0.19 | -0.53    | .60      |            |
| Standard-error of effect | 2.83     | -0.44 to 6.10 | 1.81     | .09      |            |

## C.6 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Checklist

| Section and Topic             | Item # | Checklist item                                                                                                                                                                                                                                                                                       | Location where item is reported |
|-------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| TITLE                         |        |                                                                                                                                                                                                                                                                                                      |                                 |
| Title                         | 1      | Identify the report as a systematic review.                                                                                                                                                                                                                                                          | p. 70                           |
| ABSTRACT                      |        |                                                                                                                                                                                                                                                                                                      |                                 |
| Abstract                      | 2      | See the PRISMA 2020 for Abstracts checklist.                                                                                                                                                                                                                                                         | p. 71                           |
| INTRODUCTION                  |        |                                                                                                                                                                                                                                                                                                      |                                 |
| Rationale                     | 3      | Describe the rationale for the review in the context of existing knowledge.                                                                                                                                                                                                                          | p. 73                           |
| Objectives                    | 4      | Provide an explicit statement of the objective(s) or question(s) the review addresses.                                                                                                                                                                                                               | p. 73                           |
| METHODS                       |        |                                                                                                                                                                                                                                                                                                      |                                 |
| Eligibility criteria          | 5      | Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.                                                                                                                                                                                          | p. 76                           |
| Information sources           | 6      | Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.                                                                                            | p. 76 and C.2                   |
| Search strategy               | 7      | Present the full search strategies for all databases, registers and websites, including any filters and limits used.                                                                                                                                                                                 | C.1                             |
| Selection process             | 8      | Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.                     | p. 76 and Figure 2.1            |
| Data collection process       | 9      | Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process. | p. 76                           |
| Data items                    | 10a    | List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.                        | p. 76                           |
|                               | 10b    | List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.                                                                                         | p. 76                           |
| Study risk of bias assessment | 11     | Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.                                    | p. 78 and Table 2.1             |
| Effect measures               | 12     | Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.                                                                                                                                                                  | p. 78                           |
| Synthesis methods             | 13a    | Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).                                                                                 | p. 78                           |
|                               | 13b    | Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.                                                                                                                                                | p. 78                           |
|                               | 13c    | Describe any methods used to tabulate or visually display results of individual studies and syntheses.                                                                                                                                                                                               | p. 78                           |
|                               | 13d    | Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.                                          | p. 78                           |
|                               | 13e    | Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).                                                                                                                                                                 | p. 78                           |
|                               | 13f    | Describe any sensitivity analyses conducted to assess robustness of the synthesized results.                                                                                                                                                                                                         | p. 78                           |
| Reporting bias assessment     | 14     | Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).                                                                                                                                                                              | p. 78                           |
| Certainty assessment          | 15     | Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.                                                                                                                                                                                                | p. 78                           |

## Appendix C

| Section and Topic                              | Item # | Checklist item                                                                                                                                                                                                                                                                       | Location where item is reported |
|------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>RESULTS</b>                                 |        |                                                                                                                                                                                                                                                                                      |                                 |
| Study selection                                | 16a    | Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.                                                                                         | Figure 2.1                      |
|                                                | 16b    | Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.                                                                                                                                                          | C.2                             |
| Study characteristics                          | 17     | Cite each included study and present its characteristics.                                                                                                                                                                                                                            | Table 2.1                       |
| Risk of bias in studies                        | 18     | Present assessments of risk of bias for each included study.                                                                                                                                                                                                                         | Table 2.1                       |
| Results of individual studies                  | 19     | For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.                                                     | p. 79                           |
| Results of syntheses                           | 20a    | For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.                                                                                                                                                                               | p. 79                           |
|                                                | 20b    | Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. | p. 79                           |
|                                                | 20c    | Present results of all investigations of possible causes of heterogeneity among study results.                                                                                                                                                                                       | p. 79                           |
|                                                | 20d    | Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.                                                                                                                                                                           | Table 2.2                       |
| Reporting biases                               | 21     | Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.                                                                                                                                                              | p. 79                           |
| Certainty of evidence                          | 22     | Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.                                                                                                                                                                                  | p. 79                           |
| <b>DISCUSSION</b>                              |        |                                                                                                                                                                                                                                                                                      |                                 |
| Discussion                                     | 23a    | Provide a general interpretation of the results in the context of other evidence.                                                                                                                                                                                                    | p. 110                          |
|                                                | 23b    | Discuss any limitations of the evidence included in the review.                                                                                                                                                                                                                      | p. 110                          |
|                                                | 23c    | Discuss any limitations of the review processes used.                                                                                                                                                                                                                                | p. 110                          |
|                                                | 23d    | Discuss implications of the results for practice, policy, and future research.                                                                                                                                                                                                       | p. 110                          |
| <b>OTHER INFORMATION</b>                       |        |                                                                                                                                                                                                                                                                                      |                                 |
| Registration and protocol                      | 24a    | Provide registration information for the review, including register name and registration number, or state that the review was not registered.                                                                                                                                       | p.76                            |
|                                                | 24b    | Indicate where the review protocol can be accessed, or state that a protocol was not prepared.                                                                                                                                                                                       | p.76                            |
|                                                | 24c    | Describe and explain any amendments to information provided at registration or in the protocol.                                                                                                                                                                                      | p.76                            |
| Support                                        | 25     | Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.                                                                                                                                                        | Published article               |
| Competing interests                            | 26     | Declare any competing interests of review authors.                                                                                                                                                                                                                                   | Published article               |
| Availability of data, code and other materials | 27     | Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.                                           | p. 70                           |

*Note. From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71*

## Appendix D    Supplementary Material for Chapter 3

### D.1    eMethods: Multiple Imputation for Missing Data

We imputed missing data to prevent the bias that would result by the assumption that data are missing completely at random (White et al., 2011). Given that there is substantial information on socio-demographic variables in ALSPAC which predict missingness, missing information can be assumed dependent on observed data. Thus, we employed a fully conditional specification using the `mice()` function from the MICE package (which stands for stands for multivariate imputation by chained equations) in R (Van Buuren & Groothuis-Oudshoorn, 2011).

For each variable included in our adjusted models, we used the default imputation method in the `mice()` function, which is predictive mean matching (pmm) for continuous variables and logistic regression for binary variables (logreg). Two distinct imputed datasets were created, one for the analyses looking at the 42-month child outcomes ( $n = 6,404$ ) and one for the analyses looking at the 91-month child outcomes ( $n = 5,426$ ). Each imputation model used all variables in the analyses to predict missing data across 32 imputed datasets, based on the rule of thumb that the number of imputations should at least equal the percentage of missing cases (White et al., 2011). We checked whether convergence was achieved in the imputed datasets examining diagnostic plots and ran diagnostics to check the plausibility of the datasets with the `stripplot()` function. Analyses for the adjusted models were conducted post-imputation, combining estimates across the 32 imputed data sets using Rubin's rules (White et al., 2011).

## D.2 eTables

Table D1 Descriptive Characteristics of the Sample Used in the Analyses Looking at the Outcomes at 42 Months, without Imputations for Missing Values

| Factor                                                                       | All sample    | Non-anxious group | Prenatal only | Postnatal only | Anxious-at-both-times group |
|------------------------------------------------------------------------------|---------------|-------------------|---------------|----------------|-----------------------------|
| Father age (mean and SD)                                                     | 31.20 (5.55)  | 31.15 (5.46)      | 30.98 (6.03)  | 31.45 (6.10)   | 31.79 (5.74)                |
| Number of other children (mean and SD) <sup>a</sup>                          | .76 (.89)     | .74 (.86)         | .72 (.85)     | .85 (.97)      | .95 (1.14)                  |
| Paternal prenatal anxiety (mean and SD) <sup>a,b</sup>                       | 2.92 (2.70)   | 2.14 (1.79)       | 8.13 (1.43)   | 4.10 (1.71)    | 9.40 (2.16)                 |
| Paternal postnatal anxiety (mean and SD) <sup>a,c</sup>                      | 2.48 (2.57)   | 1.69 (1.54)       | 3.29 (1.44)   | 7.45 (1.84)    | 8.57 (2.35)                 |
| Paternal Ed. Level (n and % with degree) <sup>d</sup>                        | 1439 (22.76%) | 1200 (22.624%)    | 67 (22.408%)  | 88 (22.680%)   | 84 (25.225%)                |
| Ethnicity (n and % White)                                                    | 6186 (98.27%) | 5195 (98.37%)     | 292 (97.99%)  | 380 (98.19%)   | 319 (96.96%)                |
| Social class (n and % I and II) <sup>a,e</sup>                               | 3037 (50.68%) | 2529 (50.21%)     | 160 (57.35%)  | 175 (48.08%)   | 173 (55.45%)                |
| Child sex (n and % females)                                                  | 3129 (48.94%) | 2624 (48.92%)     | 129 (42.86%)  | 207 (52.81%)   | 169 (50.30%)                |
| Marital status (n and % married) <sup>a</sup>                                | 4918 (85.53%) | 4199 (86.38%)     | 212 (80.30%)  | 267 (78.30%)   | 240 (84.51%)                |
| Past history of severe depression in fathers (n and %) <sup>a</sup>          | 314 (5.51%)   | 162 (3.35%)       | 38 (14.67%)   | 48 (14.41%)    | 66 (24.35%)                 |
| Past history of other psychiatric problems in fathers (n and %) <sup>a</sup> | 92 (1.61%)    | 45 (0.93%)        | 7 (2.68%)     | 12 (3.63%)     | 28 (10.18%)                 |
| Past history of severe depression in mothers (n and %) <sup>a</sup>          | 467 (7.40%)   | 365 (6.89%)       | 31 (10.51%)   | 36 (9.23%)     | 35 (10.57%)                 |
| Past history of other psychiatric problems in mothers (n and %)              | 131 (2.08%)   | 103 (1.94%)       | 5 (1.70%)     | 15 (3.85%)     | 8 (2.44%)                   |
| Paternal prenatal depression (n and %) <sup>a,f</sup>                        | 209 (3.26%)   | 39 (0.73%)        | 52 (17.16%)   | 15 (3.81%)     | 103 (30.66%)                |
| Paternal postnatal depression (n and %) <sup>a,g</sup>                       | 212 (3.31%)   | 31 (0.58%)        | 10 (3.31%)    | 69 (17.51%)    | 102 (30.45%)                |
| Maternal prenatal depression (n and %) <sup>a,f</sup>                        | 643 (10.64%)  | 480 (9.44%)       | 53 (18.86%)   | 57 (15.36%)    | 53 (17.38%)                 |
| Maternal postnatal depression (n and %) <sup>a,g</sup>                       | 530 (8.31%)   | 386 (7.22%)       | 37 (12.21%)   | 62 (15.86%)    | 45 (13.43%)                 |
| Maternal prenatal anxiety (n and %) <sup>a,h</sup>                           | 868 (14.46%)  | 659 (13.04%)      | 68 (24.29%)   | 68 (18.58%)    | 73 (24.09%)                 |
| Maternal postnatal anxiety (n and n and %) <sup>a,i</sup>                    | 894 (14.04%)  | 655 (12.26%)      | 67 (22.11%)   | 89 (22.82%)    | 83 (24.78%)                 |
| High emotional problems in offspring (n and %) <sup>a,j</sup>                | 397 (6.20%)   | 306 (5.70%)       | 38 (12.54%)   | 26 (6.60%)     | 27 (8.04%)                  |

## Appendix D

| Factor                                                          | All sample   | Non-anxious group | Prenatal only | Postnatal only | Anxious-at-both-times group |
|-----------------------------------------------------------------|--------------|-------------------|---------------|----------------|-----------------------------|
| High behavioural problems in offspring (n and %) <sup>a,k</sup> | 728 (11.37%) | 583 (10.86%)      | 44 (14.52%)   | 54 (13.71%)    | 47 (13.99%)                 |
| High total problems in offspring (n and %) <sup>a,l</sup>       | 563 (8.79%)  | 436 (8.12%)       | 42 (13.86%)   | 42 (10.66%)    | 43 (12.80%)                 |

*Note.* <sup>a</sup> Significant difference between the four groups (F value or Pearson's Chi-squared test,  $p < .05$ ).

<sup>b</sup> Continuous score in the Crown-Crisp Experiential Index at the 18-week gestation assessment.

<sup>c</sup> Continuous score in the Crown-Crisp Experiential Index at the 8-week postnatal assessment.

<sup>d</sup> Education level was analysed in 5 categories of attainment, although only the percentage gaining a degree is presented here for ease of reading.

<sup>e</sup> I=professional occupations; II= managerial and technical occupations.

<sup>f</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 18-week gestation assessment.

<sup>g</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 8-week postnatal assessment.

<sup>h</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 18-week gestation assessment.

<sup>i</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 8-week postnatal assessment.

<sup>j</sup> Score in the top 10% in the emotional problems scale of the Revised Rutter Parent Scale for Preschool Children at 42 months.

<sup>k</sup> Score in the top 10% in either the conduct or hyperactivity (or both) scales of the Revised Rutter Parent Scale for Preschool Children at 42 months.

<sup>l</sup> Score in the top 10% in the total problems scale of the Revised Rutter Parent Scale for Preschool Children at 42 months.

Table D2 Paternal Anxiety and Child High (Top 10%) Emotional and Behavioural Problems at 42 Months, Unadjusted and Adjusted Models, with Odds Ratios and 95% Confidence Intervals, Male Offspring Only (n = 3,264)

| Subscale of RRPSPC                     | Regression model | Non-anxious vs prenatal only     | Non-anxious vs postnatal only    | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|----------------------------------------|------------------|----------------------------------|----------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Total problems (behavioural/emotional) | Unadjusted model | <b>1.72 [1.08, 2.64], p=.016</b> | <b>1.66 [1.05, 2.52], p=.023</b> | <b>1.62 [1.00, 2.52], p=.023</b>     | 0.96 [.53, 1.75], p=.897        | 0.94 [.51, 1.73], p=.841               | 0.98 [.53, 1.79], p=.939                |
|                                        | Model 1          | <b>1.72 [1.10, 2.68], p=.017</b> | <b>1.63 [1.05, 2.52], p=.029</b> | <b>1.62 [1.02, 2.57], p=.040</b>     | 0.95 [.52, 1.72], p=.862        | 0.94 [.51, 1.74], p=.855               | 1.00 [.54, 1.83], p=.988                |
|                                        | Model 2          | <b>2.16 [1.05, 2.70], p=.031</b> | <b>2.21 [1.06, 2.68], p=.027</b> | 0.75 [.74, 1.97], p=.452             | 1.00 [.53, 1.88], p=.997        | 0.72 [.37, 1.38], p=.317               | 0.72 [.38, 1.36], p=.309                |
|                                        | Model 3          | 1.47 [.93, 2.32], p=.098         | 1.40 [.89, 2.19], p=.144         | 1.25 [.78, 2.01], p=.354             | 0.95 [.52, 1.75], p=.872        | 0.85 [.46, 1.60], p=.617               | 0.90 [.48, 1.67], p=.729                |
|                                        | Model 4          | 1.25 [.77, 2.03], p=.365         | 1.13 [.69, 1.84], p=.625         | 0.74 [.40, 1.36], p=.330             | 0.90 [.47, 1.73], p=.759        | 0.59 [.29, 1.19], p=.139               | 0.66 [.33, 1.30], p=.229                |
| Behavioural problems*                  | Unadjusted model | 1.31 [.84, 1.97], p=.214         | <b>1.53 [1.02, 2.23], p=.035</b> | 1.42 [.91, 2.13], p=.105             | 1.17 [.67, 2.05], p=.589        | 1.08 [.61, 1.93], p=.790               | 0.93 [.53, 1.61], p=.791                |
|                                        | Model 1          | 1.28 [.84, 1.97], p=.255         | 1.46 [.98, 2.17], p=.060         | 1.38 [.90, 2.11], p=.138             | 1.14 [.65, 1.99], p=.645        | 1.08 [.60, 1.92], p=.806               | 0.94 [.54, 1.65], p=.836                |
|                                        | Model 2          | 1.32 [.84, 2.07], p=.224         | 1.50 [.99, 2.28], p=.059         | 1.09 [.69, 1.71], p=.711             | 1.14 [.63, 2.05], p=.674        | 0.82 [.45, 1.52], p=.535               | 0.73 [.40, 1.31], p=.287                |
|                                        | Model 3          | 1.17 [.76, 1.80], p=.485         | 1.35 [.90, 2.01], p=.150         | 1.16 [.75, 1.78], p=.514             | 1.15 [.65, 2.03], p=.623        | 0.99 [.55, 1.78], p=.973               | 0.86 [.49, 1.51], p=.599                |
|                                        | Model 4          | 1.07 [.68, 1.69], p=.754         | 1.24 [.81, 1.90], p=.315         | 0.93 [.55, 1.57], p=.787             | 1.16 [.64, 2.09], p=.630        | 0.87 [.46, 1.62], p=.652               | 0.75 [.41, 1.38], p=.351                |
| Emotional problems                     | Unadjusted model | <b>2.18 [1.30, 3.49], p=.002</b> | 1.57 [.88, 2.61], p=.101         | <b>1.76 [.99, 2.93], p=.041</b>      | 0.72 [.36, 1.44], p=.352        | 0.81 [.40, 1.61], p=.541               | 1.12 [.54, 2.33], p=.761                |
|                                        | Model 1          | <b>2.19 [1.33, 3.60], p=.002</b> | 1.58 [.92, 2.72], p=.098         | <b>1.95 [1.13, 3.37], p=.016</b>     | 0.72 [.36, 1.45], p=.362        | 0.89 [.44, 1.80], p=.750               | 1.23 [.59, 2.57], p=.573                |
|                                        | Model 2          | <b>2.10 [1.27, 3.49], p=.004</b> | 1.64 [.94, 2.84], p=.080         | 1.56 [.90, 2.73], p=.116             | 0.78 [.38, 1.58], p=.488        | 0.74 [.36, 1.52], p=.416               | 0.96 [.45, 2.01], p=.905                |

# Appendix D

| Subscale of RRPSPC | Regression model | Non-anxious vs prenatal only     | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|--------------------|------------------|----------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
|                    | Model 3          | <b>1.93 [1.17, 3.19], p=.010</b> | 1.36 [.79, 2.35], p=.272      | 1.40 [.81, 2.45], p=.230             | 0.70 [.35, 1.43], p=.330        | 0.73 [.36, 1.48], p=.378               | 1.03 [.49, 2.17], p=.932                |
|                    | Model 4          | 1.58 [.92, 2.70], p=.095         | 1.17 [.65, 2.10], p=.593      | 0.85 [.42, 1.71], p=.652             | 0.74 [.35, 1.58], p=.438        | 0.54 [.25, 1.18], p=.121               | 0.73 [.32, 1.63], p=.439                |

*Note.* The first group in each contrast was the reference group in the analyses. p-values have not been corrected for multiple-hypothesis testing.

Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father social class, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal and 8-week postnatal, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal and 8-week postnatal, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal and 8-week postnatal, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal and 8-week postnatal, maternal and paternal history of severe depression and other psychiatric problems).

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

\*Scale created by the authors, considering those who scored in the top 10% in the conduct and/or hyperactivity scales.

RRPSPC = Revised Rutter Parent Scale for Preschool Children.

# Appendix D

Table D3 Paternal Anxiety and Child High (top 10%) Emotional and Behavioural Problems at 42 Months, Unadjusted and Adjusted Models, with Odds Ratios and 95% Confidence Intervals, Female Offspring Only (n = 3,129)

| Subscale of RRPSPC                     | Regression model | Non-anxious vs prenatal only        | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|----------------------------------------|------------------|-------------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Total problems (behavioural/emotional) | Unadjusted model | <b>1.81 [1.02, 3.04], p=.032</b>    | 1.07 [.61, 1.77], p=.795      | <b>1.72 [1.03, 2.74], p=.030</b>     | 0.59 [.28, 1.24], p=.159        | 0.95 [.47, 1.93], p=.881               | 1.60 [.80, 3.24], p=.181                |
|                                        | Model 1          | <b>1.81 [1.05, 3.13], p=.033</b>    | 1.10 [.65, 1.88], p=.714      | <b>1.78 [1.09, 2.91], p=.022</b>     | 0.61 [.29, 1.27], p=.186        | 0.98 [.48, 1.98], p=.956               | 1.61 [.80, 3.22], p=.179                |
|                                        | Model 2          | 1.52 [.85, 2.72], p=.161            | 0.92 [.53, 1.60], p=.761      | 1.40 [.83, 2.37], p=.206             | 0.60 [.28, 1.31], p=.202        | 0.92 [.44, 1.95], p=.835               | 1.53 [.74, 3.17], p=.254                |
|                                        | Model 3          | 1.48 [.84, 2.60], p=.174            | 0.90 [.52, 1.55], p=.700      | 1.46 [.88, 2.42], p=.141             | 0.61 [.29, 1.29], p=.194        | 0.99 [.48, 2.03], p=.971               | 1.62 [.80, 3.29], p=.179                |
|                                        | Model 4          | 1.37 [.76, 2.48], p=.295            | 0.95 [.54, 1.67], p=.863      | 1.47 [.81, 2.65], p=.205             | 0.69 [.32, 1.50], p=.355        | 1.07 [.50, 2.30], p=.863               | 1.54 [.74, 3.23], p=.252                |
| Behavioural problems*                  | Unadjusted model | 1.39 [.78, 2.32], p=.228            | 1.11 [.68, 1.74], p=.660      | 1.25 [.74, 2.00], p=.383             | 0.80 [.40, 1.61], p=.521        | 0.89 [.44, 1.84], p=.758               | 1.12 [.58, 2.17], p=.731                |
|                                        | Model 1          | 1.41 [.82, 2.42], p=.216            | 1.09 [.68, 1.75], p=.721      | 1.24 [.76, 2.05], p=.387             | 0.77 [.39, 1.55], p=.470        | 0.88 [.44, 1.80], p=.734               | 1.14 [.59, 2.21], p=.692                |
|                                        | Model 2          | 1.10 [.62, 1.96], p=.745            | 0.98 [.60, 1.61], p=.934      | 1.03 [.61, 1.74], p=.919             | 0.89 [.43, 1.85], p=.755        | 0.93 [.44, 1.98], p=.859               | 1.05 [.52, 2.10], p=.891                |
|                                        | Model 3          | 1.19 [.69, 2.07], p=.529            | 0.98 [.61, 1.59], p=.947      | 1.10 [.66, 1.82], p=.716             | 0.82 [.41, 1.66], p=.590        | 0.92 [.45, 1.89], p=.820               | 1.12 [.57, 2.17], p=.746                |
|                                        | Model 4          | 1.20 [.68, 2.13], p=.521            | 1.01 [.61, 1.66], p=.973      | 1.15 [.64, 2.06], p=.643             | 0.84 [.41, 1.72], p=.628        | 0.95 [.45, 2.02], p=.900               | 1.14 [.57, 2.28], p=.715                |
| Emotional problems                     | Unadjusted model | <b>2.67 [1.54, 4.41], p&lt;.001</b> | 0.84 [.41, 1.53], p=.596      | 1.15 [.58, 2.07], p=.669             | <b>0.31 [.13, .69], p=.005</b>  | <b>0.43 [.19, .93], p=.036</b>         | 1.37 [.56, 3.37], p=.482                |
|                                        | Model 1          | <b>2.70 [1.58, 4.58], p&lt;.001</b> | 0.89 [.46, 1.72], p=.731      | 1.23 [.65, 2.32], p=.528             | <b>0.33 [.15, .75], p=.008</b>  | 0.46 [.21, 1.01], p=.053               | 1.38 [.57, 3.35], p=.477                |
|                                        | Model 2          | <b>2.55 [1.47, 4.43], p=.001</b>    | 0.73 [.37, 1.44], p=.366      | 0.97 [.50, 1.86], p=.919             | <b>0.29 [.12, .66], p=.004</b>  | <b>0.38 [.17, .86], p=.021</b>         | 1.32 [.53, 3.26], p=.549                |

# Appendix D

| Subscale of RRPSPC | Regression model | Non-anxious vs prenatal only     | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|--------------------|------------------|----------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
|                    | Model 3          | <b>2.26 [1.31, 3.90], p=.003</b> | 0.70 [.36, 1.37], p=.297      | 0.97 [.51, 1.85], p=.923             | <b>0.31 [.14, .71], p=.006</b>  | <b>0.43 [.19, .96], p=.040</b>         | 1.38 [.56, 3.38], p=.478                |
|                    | Model 4          | <b>2.15 [1.22, 3.81], p=.009</b> | 0.67 [.33, 1.34], p=.253      | 0.90 [.42, 1.92], p=.791             | <b>0.31 [.13, .73], p=.007</b>  | 0.42 [.18, 1.00], p=.049               | 1.36 [.53, 3.44], p=.520                |

Note. The first group in each contrast was the reference group in the analyses. p-values have not been corrected for multiple-hypothesis testing.

Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father social class, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal and 8-week postnatal, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal and 8-week postnatal, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal and 8-week postnatal, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal and 8-week postnatal, maternal and paternal history of severe depression and other psychiatric problems).

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

\*Scale created by the authors, considering those who scored in the top 10% in the conduct and/or hyperactivity scales.

RRPSPC = Revised Rutter Parent Scale for Preschool Children.

# Appendix D

Table D4 Paternal Anxiety and Child High (Top 10%) Emotional and Behavioural Problems at 42 Months, Unadjusted and Adjusted Models, with Odds Ratios and 95% Confidence Intervals, Families Where the Biological Father Was Still Living with the Family at the 3-year Assessment Only (n = 5,439)

| Subscale of RRPSPC                     | Regression model | Non-anxious vs prenatal only        | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|----------------------------------------|------------------|-------------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Total problems (behavioural/emotional) | Unadjusted model | <b>1.56 [1.01, 2.32], p=.037</b>    | 1.42 [.96, 2.04], p=.069      | <b>1.66 [1.11, 2.41], p=.010</b>     | 0.91 [.53, 1.57], p=.735        | 1.07 [.62, 1.85], p=.811               | 1.17 [.70, 1.97], p=.545                |
|                                        | Model 1          | <b>1.55 [1.02, 2.35], p=.039</b>    | 1.43 [.98, 2.08], p=.065      | <b>1.70 [1.16, 2.50], p=.007</b>     | 0.92 [.54, 1.58], p=.763        | 1.10 [.64, 1.90], p=.738               | 1.19 [.71, 2.00], p=.504                |
|                                        | Model 2          | 1.43 [.92, 2.22], p=.114            | 1.36 [.92, 2.02], p=.126      | 1.29 [.86, 1.95], p=.222             | 0.95 [.54, 1.69], p=.873        | 0.91 [.51, 1.62], p=.737               | 0.95 [.55, 1.64], p=.849                |
|                                        | Model 3          | 1.39 [.91, 2.13], p=.124            | 1.21 [.83, 1.78], p=.326      | 1.41 [.95, 2.09], p=.090             | 0.87 [.50, 1.51], p=.622        | 1.01 [.58, 1.76], p=.972               | 1.16 [.68, 1.96], p=.581                |
|                                        | Model 4          | 1.26 [.81, 1.95], p=.307            | 1.12 [.75, 1.68], p=.574      | 1.19 [.74, 1.91], p=.471             | 0.89 [.51, 1.58], p=.694        | 0.95 [.52, 1.71], p=.854               | 1.06 [.60, 1.86], p=.839                |
| Behavioural problems*                  | Unadjusted model | 1.31 [.87, 1.89], p=.173            | 1.29 [.91, 1.79], p=.141      | 1.36 [.93, 1.92], p=.095             | 0.99 [.60, 1.63], p=.958        | 1.04 [.63, 1.74], p=.880               | 1.05 [.65, 1.70], p=.828                |
|                                        | Model 1          | 1.32 [.89, 1.93], p=.163            | 1.27 [.91, 1.79], p=.162      | 1.34 [.94, 1.93], p=.109             | 0.97 [.59, 1.59], p=.898        | 1.02 [.61, 1.70], p=.936               | 1.05 [.65, 1.70], p=.827                |
|                                        | Model 2          | 1.22 [.81, 1.83], p=.342            | 1.20 [.84, 1.72], p=.310      | 1.10 [.75, 1.61], p=.640             | 0.99 [.59, 1.67], p=.966        | 0.90 [.52, 1.55], p=.702               | 0.91 [.55, 1.51], p=.715                |
|                                        | Model 3          | 1.18 [.80, 1.75], p=.396            | 1.15 [.81, 1.62], p=.437      | 1.18 [.82, 1.71], p=.369             | 0.97 [.59, 1.60], p=.900        | 1.00 [.60, 1.67], p=.999               | 1.03 [.64, 1.67], p=.897                |
|                                        | Model 4          | 1.13 [.76, 1.69], p=.534            | 1.08 [.76, 1.55], p=.657      | 1.05 [.68, 1.61], p=.829             | 0.95 [.57, 1.59], p=.860        | 0.92 [.54, 1.59], p=.776               | .97 [.58, 1.61], p=.899                 |
| Emotional problems                     | Unadjusted model | <b>2.17 [1.40, 3.25], p&lt;.001</b> | 1.09 [.65, 1.71], p=.737      | <b>1.68 [1.06, 2.56], p=.020</b>     | <b>0.50 [.27, .92], p=.027</b>  | 0.78 [.43, 1.38], p=.389               | 1.55 [.83, 2.93], p=.169                |
|                                        | Model 1          | <b>2.13 [1.40, 3.26], p&lt;.001</b> | 1.12 [.69, 1.82], p=.643      | <b>1.84 [1.18, 2.86], p=.007</b>     | <b>0.53 [.28, .97], p=.041</b>  | 0.86 [.48, 1.55], p=.617               | 1.64 [.87, 3.08], p=.124                |
|                                        | Model 2          | <b>2.15 [1.39, 3.32], p=.001</b>    | 1.06 [.65, 1.74], p=.814      | 1.44 [.91, 2.27], p=.118             | <b>0.49 [.26, .93], p=.028</b>  | 0.67 [.37, 1.22], p=.189               | 1.36 [.71, 2.58], p=.355                |

# Appendix D

| Subscale of RRPSPC | Regression model | Non-anxious vs prenatal only     | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|--------------------|------------------|----------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
|                    | Model 3          | <b>1.92 [1.25, 2.95], p=.003</b> | 0.96 [.59, 1.57], p=.876      | 1.41 [.90, 2.21], p=.130             | <b>0.50 [.27, .93], p=.029</b>  | 0.73 [.41, 1.32], p=.303               | 1.47 [.78, 2.76], p=.235                |
|                    | Model 4          | <b>1.72 [1.10, 2.68], p=.017</b> | 0.83 [.50, 1.38], p=.472      | 0.99 [.57, 1.72], p=.974             | <b>0.48 [.25, .92], p=.027</b>  | 0.58 [.30, 1.10], p=.094               | 1.19 [.61, 2.35], p=.606                |

Note. The first group in each contrast was the reference group in the analyses. p-values have not been corrected for multiple-hypothesis testing.

Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father social class, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal and 8-week postnatal, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal and 8-week postnatal, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal and 8-week postnatal, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal and 8-week postnatal, maternal and paternal history of severe depression and other psychiatric problems).

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

\*Scale created by the authors, considering those who scored in the top 10% in the conduct and/or hyperactivity scales.

RRPSPC = Revised Rutter Parent Scale for Preschool Children.

Table D5 Descriptive Characteristics of the Sample Used in the Analyses Looking at the Outcomes at 91 Months, without Imputations for Missing Values

| Factor                                                                       | All sample    | Non-anxious group | Prenatal only | Postnatal only | Anxious-at-both-times group |
|------------------------------------------------------------------------------|---------------|-------------------|---------------|----------------|-----------------------------|
| Father age (mean and SD)                                                     | 31.47 (5.46)  | 31.42 (5.41)      | 31.33 (5.41)  | 31.57 (5.99)   | 32.21 (5.62)                |
| Number of other children (mean and SD) <sup>a</sup>                          | 0.74 (0.88)   | 0.73 (0.86)       | 0.71 (0.81)   | 0.80 (0.93)    | 0.95 (1.20)                 |
| Paternal prenatal anxiety (mean and SD) <sup>a,b</sup>                       | 2.92 (2.68)   | 2.14 (1.80)       | 8.12 (1.45)   | 4.17 (1.67)    | 9.23 (2.01)                 |
| Paternal postnatal anxiety (mean and SD) <sup>a,c</sup>                      | 2.46 (2.53)   | 1.69 (1.53)       | 3.31 (1.43)   | 7.40 (1.76)    | 8.44 (2.24)                 |
| Paternal Ed. Level (n and % with degree) <sup>d</sup>                        | 1317 (24.57%) | 1099 (24.40%)     | 58 (22.66%)   | 83 (26.02%)    | 77 (27.40%)                 |
| Paternal ethnicity (n and % White)                                           | 5259 (98.39%) | 4417 (98.44%)     | 252 (98.05%)  | 317 (98.75%)   | 273 (97.50%)                |
| Paternal social class (n and % I and II) <sup>e</sup>                        | 2678 (52.41%) | 2224 (51.82%)     | 137 (56.38%)  | 158 (51.97%)   | 159 (58.67%)                |
| Child sex (n and % females)                                                  | 2670 (49.29%) | 2242 (49.24%)     | 116 (45.14%)  | 173 (53.56%)   | 139 (48.94%)                |
| Marital status of fathers (n and % married) <sup>a</sup>                     | 4270 (86.67%) | 3640 (87.50%)     | 186 (81.94%)  | 228 (79.17%)   | 216 (85.71%)                |
| Past history of severe depression in fathers (n and %) <sup>a</sup>          | 252 (5.16%)   | 130 (3.14%)       | 31 (13.90%)   | 37 (13.26%)    | 54 (22.41%)                 |
| Past history of other psychiatric problems in fathers (n and %) <sup>a</sup> | 77 (1.57%)    | 41 (0.99%)        | 7 (3.11%)     | 9 (3.24%)      | 20 (8.23%)                  |
| Past history of severe depression in mothers (n and %) <sup>a</sup>          | 359 (6.69%)   | 282 (6.24%)       | 20 (7.91%)    | 28 (8.70%)     | 29 (10.43%)                 |
| Past history of other psychiatric problems in mothers (n and %) <sup>a</sup> | 114 (2.12%)   | 90 (1.99%)        | <5 (<2.00%)   | 16 (4.97%)     | 6 (2.16%)                   |
| Paternal prenatal depression (n and %) <sup>a,f</sup>                        | 174 (3.21%)   | 35 (0.77%)        | 39 (15.06%)   | 13 (4.01%)     | 87 (30.63%)                 |
| Paternal postnatal depression (n and %) <sup>a,g</sup>                       | 169 (3.12%)   | 25 (0.55%)        | 7 (2.71%)     | 56 (17.28%)    | 81 (28.52%)                 |
| Paternal depression at 73 months (n and %) <sup>a,h</sup>                    | 195 (5.64%)   | 97 (3.30%)        | 17 (10.56%)   | 37 (19.07%)    | 44 (26.83%)                 |
| Maternal prenatal depression (n and %) <sup>a,f</sup>                        | 510 (9.93%)   | 371 (8.58%)       | 45 (18.60%)   | 46 (14.94%)    | 48 (18.25%)                 |
| Maternal postnatal depression (n and %) <sup>a,g</sup>                       | 446 (8.24%)   | 324 (7.12%)       | 32 (12.36%)   | 52 (16.15%)    | 38 (13.43%)                 |
| Maternal depression at 73 months (n and %) <sup>a,h</sup>                    | 626 (12.58%)  | 486 (11.62%)      | 38 (16.03%)   | 56 (19.05%)    | 46 (17.56%)                 |
| Maternal prenatal anxiety (n and %) <sup>a,i</sup>                           | 667 (13.29%)  | 515 (12.01%)      | 49 (20.33%)   | 53 (17.49%)    | 60 (22.99%)                 |
| Maternal postnatal anxiety (n and %) <sup>a,j</sup>                          | 739 (13.67%)  | 535 (11.77%)      | 59 (22.78%)   | 74 (22.98%)    | 71 (25.09%)                 |
| Maternal anxiety at 73 months (n and %) <sup>a,k</sup>                       | 586 (11.79%)  | 450 (10.77%)      | 35 (14.71%)   | 51 (17.35%)    | 50 (19.16%)                 |
| Paternal anxiety at 73 months (n and %) <sup>a,k</sup>                       | 504 (14.59%)  | 273 (9.30%)       | 51 (31.68%)   | 68 (35.05%)    | 112 (68.71%)                |
| Any diagnosis (n and %) <sup>a,l</sup>                                       | 342 (6.30%)   | 265 (5.81%)       | 20 (7.72%)    | 21 (6.48%)     | 36 (12.68%)                 |
| Any behavioural disorder diagnosis (n and %) <sup>a,l</sup>                  | 227 (4.18%)   | 174 (3.82%)       | 12 (4.63%)    | 15 (4.63%)     | 26 (9.16%)                  |

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| Factor                                                  | All sample  | Non-anxious group | Prenatal only | Postnatal only | Anxious-at-both-times group |
|---------------------------------------------------------|-------------|-------------------|---------------|----------------|-----------------------------|
| Any emotional disorder diagnosis (n and %) <sup>l</sup> | 148 (2.73%) | 118 (2.59%)       | 8 (3.09%)     | 9 (2.78%)      | 13 (4.58%)                  |
| Any anxiety disorder diagnosis (n and %) <sup>l</sup>   | 142 (2.62%) | 113 (2.48%)       | 8 (3.09%)     | 8 (2.47%)      | 13 (4.58%)                  |

### Note.

<sup>a</sup> Significant difference between the four groups ( $F$  value or Pearson's Chi-squared test,  $p < .05$ ).

<sup>b</sup> Continuous score in the Crown-Crisp Experiential Index at the 18-week gestation assessment.

<sup>c</sup> Continuous score in the Crown-Crisp Experiential Index at the 8-week postnatal assessment.

<sup>d</sup> Education level was analysed in 5 categories of attainment, although only the percentage gaining a degree is presented here for ease of reading.

<sup>e</sup> I=professional occupations; II= managerial and technical occupations.

<sup>f</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 18-week gestation assessment.

<sup>g</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 8-week postnatal assessment.

<sup>h</sup> Score > 12 in the Edinburgh Postnatal Depression Scale at the 73-month assessment.

<sup>i</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 18-week gestation assessment.

<sup>j</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 8-week postnatal assessment.

<sup>k</sup> Score in the top 15% in the Crown-Crisp Experiential Index at the 73-month assessment.

<sup>l</sup> Assessed via the Development and Wellbeing Assessment - Parent Questionnaire at the 91-month assessment.

Table D6 Paternal Anxiety and Child Psychiatric Diagnoses at 91 Months, Unadjusted and Adjusted Models, with Odds Ratios and 95% Confidence Intervals,  
Male Offspring Only (n = 2,747)

| DAWBA diagnoses       | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|-----------------------|------------------|------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Any disorder          | Unadjusted model | 1.50 [.86, 2.62], p=.155     | 1.40 [.80, 2.44], p=.236      | <b>2.62 [1.66, 4.15], p&lt;.001</b>  | 0.93 [.44, 1.99], p=.858        | 1.75 [.88, 3.48], p=.111               | 1.88 [.94, 3.72], p=.072                |
|                       | Model 1          | 1.48 [.85, 2.59], p=.169     | 1.34 [.77, 2.35], p=.302      | <b>2.49 [1.57, 3.96], p&lt;.001</b>  | 0.91 [.42, 1.94], p=.801        | 1.68 [.84, 3.36], p=.141               | 1.86 [.93, 3.71], p=.080                |
|                       | Model 2          | 1.49 [.84, 2.63], p=.169     | 1.32 [.75, 2.33], p=.336      | <b>2.26 [1.41, 3.63], p=.001</b>     | 0.89 [.41, 1.92], p=.760        | 1.52 [.75, 3.07], p=.245               | 1.71 [.85, 3.46], p=.135                |
|                       | Model 3          | 1.38 [.78, 2.43], p=.271     | 1.13 [.63, 2.01], p=.683      | <b>2.38 [1.48, 3.83], p&lt;.001</b>  | 0.82 [.38, 1.78], p=.615        | 1.73 [.85, 3.49], p=.128               | <b>2.11 [1.04, 4.29], p=.040</b>        |
|                       | Model 4          | 1.26 [.69, 2.28], p=.448     | 1.01 [.54, 1.86], p=.987      | <b>2.14 [1.19, 3.87], p=.012</b>     | 0.80 [.36, 1.78], p=.583        | 1.70 [.81, 3.59], p=.164               | 2.13 [1.00, 4.54], p=.050               |
| Behavioural disorders | Unadjusted model | 1.33 [.68, 2.60], p=.397     | 1.52 [.82, 2.82], p=.183      | <b>3.13 [1.92, 5.10], p&lt;.001</b>  | 1.14 [.48, 2.73], p=.770        | <b>2.34 [1.07, 5.15], p=.034</b>       | 2.06 [.98, 4.33], p=.058                |
|                       | Model 1          | 1.32 [.67, 2.57], p=.420     | 1.46 [.78, 2.72], p=.233      | <b>3.01 [1.84, 4.94], p&lt;.001</b>  | 1.11 [.46, 2.66], p=.818        | <b>2.29 [1.04, 5.05], p=.040</b>       | 2.06 [.97, 4.38], p=.058                |
|                       | Model 2          | 1.34 [.68, 2.64], p=.396     | 1.43 [.76, 2.69], p=.263      | <b>2.63 [1.59, 4.37], p&lt;.001</b>  | 1.07 [.44, 2.60], p=.885        | 1.96 [.88, 4.40], p=.101               | 1.84 [.86, 3.95], p=.119                |
|                       | Model 3          | 1.23 [.62, 2.42], p=.554     | 1.27 [.67, 2.40], p=.459      | <b>2.85 [1.72, 4.72], p&lt;.001</b>  | 1.04 [.43, 2.52], p=.938        | <b>2.32 [1.04, 5.17], p=.039</b>       | <b>2.24 [1.04, 4.81], p=.038</b>        |
|                       | Model 4          | 1.24 [.61, 2.50], p=.556     | 1.23 [.63, 2.43], p=.544      | <b>3.12 [1.66, 5.89], p&lt;.001</b>  | 1.00 [.40, 2.49], p=.997        | <b>2.53 [1.09, 5.89], p=.032</b>       | <b>2.53 [1.13, 5.68], p=.024</b>        |
| Emotional disorders   | Unadjusted model | 1.27 [.50, 3.21], p=.613     | 1.44 [.61, 3.38], p=.402      | 1.49 [.63, 3.50], p=.359             | 1.13 [.34, 3.80], p=.839        | 1.17 [.35, 3.94], p=.795               | 1.04 [.33, 3.29], p=.952                |
|                       | Model 1          | 1.25 [.49, 3.16], p=.638     | 1.37 [.58, 3.23], p=.476      | 1.40 [.59, 3.33], p=.443             | 1.09 [.33, 3.68], p=.885        | 1.12 [.33, 3.80], p=.853               | 1.03 [.32, 3.30], p=.965                |
|                       | Model 2          | 1.23 [.48, 3.12], p=.667     | 1.38 [.58, 3.26], p=.468      | 1.32 [.56, 3.14], p=.528             | 1.12 [.33, 3.81], p=.855        | 1.08 [.32, 3.66], p=.905               | 0.96 [.30, 3.10], p=.947                |

# Appendix D

| DAWBA diagnoses   | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|-------------------|------------------|------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Anxiety disorders | Model 3          | 1.10 [.43, 2.83], p=.844     | 0.99 [.40, 2.42], p=.974      | 1.26 [.52, 3.05], p=.612             | 0.90 [.26, 3.13], p=.863        | 1.14 [.33, 3.95], p=.832               | 1.28 [.38, 4.23], p=.690                |
|                   | Model 4          | 0.85 [.32, 2.30], p=.751     | 0.73 [.27, 1.96], p=.534      | 0.73 [.24, 2.24], p=.585             | 0.86 [.23, 3.19], p=.821        | 0.86 [.22, 3.31], p=.827               | 1.00 [.27, 3.66], p=.998                |
|                   | Unadjusted model | 1.31 [.52, 3.32], p=.566     | 1.23 [.49, 3.11], p=.661      | 1.54 [.65, 3.62], p=.322             | 0.94 [.27, 3.31], p=.921        | 1.17 [.35, 3.94], p=.795               | 1.25 [.37, 4.20], p=.716                |
|                   | Model 1          | 1.28 [.51, 3.25], p=.598     | 1.16 [.46, 2.95], p=.756      | 1.48 [.63, 3.51], p=.369             | 0.90 [.26, 3.20], p=.875        | 1.16 [.34, 3.90], p=.815               | 1.28 [.38, 4.33], p=.691                |
|                   | Model 2          | 1.27 [.50, 3.22], p=.621     | 1.17 [.46, 2.99], p=.737      | 1.38 [.58, 3.28], p=.469             | 0.93 [.26, 3.32], p=.907        | 1.09 [.32, 3.69], p=.893               | 1.17 [.35, 3.99], p=.798                |
|                   | Model 3          | 1.14 [.44, 2.94], p=.785     | 0.82 [.31, 2.18], p=.694      | 1.30 [.53, 3.15], p=.567             | 0.72 [.20, 2.66], p=.623        | 1.14 [.33, 3.92], p=.841               | 1.58 [.45, 5.54], p=.478                |
|                   | Model 4          | 0.92 [.34, 2.48], p=.865     | 0.68 [.24, 1.93], p=.469      | 0.91 [.30, 2.73], p=.861             | 0.74 [.19, 2.87], p=.664        | 0.99 [.26, 3.75], p=.985               | 1.33 [.35, 5.09], p=.674                |

*Note.* The first group in each contrast was the reference group in the analyses. p-values have not been corrected for multiple-hypothesis testing.

Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, paternal anxiety in the Crown-Crisp Experiential Index at 73 months, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal and paternal history of severe depression and other psychiatric problems).

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

DAWBA = Development and Wellbeing Assessment - Parent Questionnaire.

# Appendix D

Table D7 Paternal Anxiety and Child Psychiatric Diagnoses at 91 Months, Unadjusted and Adjusted Models, with Odds Ratios and 95% Confidence Intervals, Female Offspring Only (n = 2,670)

| DAWBA diagnoses       | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|-----------------------|------------------|------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Any disorder          | Unadjusted model | 1.03 [.41, 2.58], p=.951     | 0.82 [.35, 1.90], p=.645      | <b>1.96 [1.03, 3.76], p=.042</b>     | 0.80 [.24, 2.68], p=.714        | 1.91 [.64, 5.66], p=.244               | 2.39 [.86, 6.64], p=.094                |
|                       | Model 1          | 1.02 [.40, 2.55], p=.975     | 0.83 [.36, 1.93], p=.670      | <b>1.98 [1.03, 3.79], p=.040</b>     | 0.82 [.24, 2.76], p=.749        | 1.95 [.66, 5.78], p=.230               | 2.37 [.85, 6.60], p=.098                |
|                       | Model 2          | 0.89 [.35, 2.26], p=.807     | 0.71 [.30, 1.65], p=.423      | 1.65 [.85, 3.20], p=.137             | 0.79 [.23, 2.70], p=.712        | 1.85 [.62, 5.58], p=.272               | 2.33 [.83, 6.55], p=.107                |
|                       | Model 3          | 0.86 [.34, 2.22], p=.760     | 0.65 [.27, 1.53], p=.320      | 1.53 [.78, 3.02], p=.219             | 0.75 [.22, 2.59], p=.648        | 1.77 [.58, 5.43], p=.314               | 2.37 [.83, 6.76], p=.107                |
|                       | Model 4          | 0.66 [.24, 1.83], p=.428     | 0.55 [.22, 1.35], p=.194      | 0.89 [.35, 2.26], p=.803             | 0.83 [.23, 3.01], p=.777        | 1.34 [.40, 4.50], p=.639               | 1.61 [.51, 5.08], p=.416                |
| Behavioural disorders | Unadjusted model | 0.80 [.19, 3.34], p=.762     | 0.81 [.25, 2.62], p=.720      | 1.35 [.48, 3.81], p=.566             | 1.01 [.17, 6.12], p=.995        | 1.69 [.30, 9.40], p=.549               | 1.68 [.37, 7.63], p=.502                |
|                       | Model 1          | 0.77 [.18, 3.22], p=.722     | 0.79 [.24, 2.57], p=.696      | 1.34 [.48, 3.78], p=.578             | 1.02 [.17, 6.25], p=.979        | 1.74 [.31, 9.69], p=.528               | 1.70 [.37, 7.74], p=.494                |
|                       | Model 2          | 0.65 [.15, 2.77], p=.564     | 0.69 [.21, 2.27], p=.543      | 1.10 [.38, 3.13], p=.864             | 1.06 [.17, 6.54], p=.952        | 1.68 [.30, 9.48], p=.559               | 1.58 [.34, 7.29], p=.555                |
|                       | Model 3          | 0.68 [.16, 2.89], p=.602     | 0.62 [.19, 2.07], p=.441      | 1.04 [.36, 3.04], p=.944             | 0.92 [.15, 5.75], p=.927        | 1.53 [.27, 8.73], p=.633               | 1.67 [.35, 7.84], p=.519                |
|                       | Model 4          | 0.49 [.11, 2.33], p=.373     | 0.50 [.14, 1.77], p=.284      | 0.58 [.13, 2.49], p=.463             | 1.01 [.15, 6.81], p=.989        | 1.17 [.18, 7.72], p=.870               | 1.16 [.21, 6.40], p=.869                |
| Emotional disorders   | Unadjusted model | 1.10 [.34, 3.56], p=.878     | 0.73 [.23, 2.36], p=.597      | 2.19 [.98, 4.91], p=.057             | 0.66 [.13, 3.35], p=.621        | 2.00 [.50, 7.91], p=.324               | 3.01 [.76, 11.85], p=.116               |
|                       | Model 1          | 1.11 [.34, 3.60], p=.866     | 0.76 [.23, 2.46], p=.644      | 2.23 [.99, 5.02], p=.051             | 0.68 [.14, 3.46], p=.647        | 2.02 [.51, 8.01], p=.317               | 2.95 [.75, 11.64], p=.122               |
|                       | Model 2          | 0.99 [.30, 3.24], p=.982     | 0.63 [.19, 2.05], p=.444      | 1.88 [.83, 4.27], p=.129             | 0.64 [.13, 3.26], p=.591        | 1.91 [.48, 7.64], p=.361               | 2.98 [.75, 11.86], p=.120               |

# Appendix D

| DAWBA diagnoses   | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|-------------------|------------------|------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Anxiety disorders | Model 3          | 1.01 [.30, 3.39], p=.982     | 0.56 [.17, 1.84], p=.339      | 1.78 [.77, 4.13], p=.179             | 0.55 [.11, 2.86], p=.478        | 1.76 [.43, 7.17], p=.433               | 3.19 [.79, 12.94], p=.104               |
|                   | Model 4          | 0.84 [.23, 3.02], p=.790     | 0.53 [.16, 1.82], p=.315      | 1.14 [.36, 3.60], p=.825             | 0.63 [.12, 3.46], p=.599        | 1.35 [.29, 6.23], p=.697               | 2.14 [.47, 9.77], p=.328                |
|                   | Unadjusted model | 1.16 [.36, 3.79], p=.801     | 0.77 [.24, 2.51], p=.669      | <b>2.32 [1.03, 5.23], p=.041</b>     | 0.66 [.13, 3.35], p=.621        | 2.00 [.50, 7.91], p=.324               | 3.01 [.76, 11.85], p=.116               |
|                   | Model 1          | 1.17 [.36, 3.82], p=.793     | 0.80 [.25, 2.61], p=.716      | <b>2.37 [1.05, 5.34], p=.037</b>     | 0.69 [.14, 3.47], p=.648        | 2.02 [.51, 8.03], p=.315               | 2.95 [.75, 11.64], p=.122               |
|                   | Model 2          | 1.07 [.33, 3.51], p=.913     | 0.68 [.21, 2.21], p=.518      | 2.04 [.90, 4.63], p=.089             | 0.63 [.12, 3.23], p=.583        | 1.91 [.48, 7.62], p=.361               | 3.01 [.76, 11.94], p=.117               |
|                   | Model 3          | 1.07 [.32, 3.58], p=.918     | 0.58 [.18, 1.93], p=.377      | 1.86 [.80, 4.35], p=.149             | 0.55 [.10, 2.85], p=.474        | 1.75 [.43, 7.18], p=.437               | 3.20 [.79, 13.02], p=.104               |
|                   | Model 4          | 0.91 [.25, 3.30], p=.887     | 0.57 [.17, 1.95], p=.370      | 1.27 [.40, 4.09], p=.684             | 0.63 [.11, 3.44], p=.590        | 1.40 [.30, 6.47], p=.668               | 2.23 [.48, 10.33], p=.304               |

*Note.* The first group in each contrast was the reference group in the analyses. p-values have not been corrected for multiple-hypothesis testing.

Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, paternal anxiety in the Crown-Crisp Experiential Index at 73 months, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal and paternal history of severe depression and other psychiatric problems).

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

DAWBA = Development and Wellbeing Assessment - Parent Questionnaire.

Appendix D

Table D8 Paternal Anxiety and Child Psychiatric Diagnoses at 91 Months, Unadjusted and Adjusted Models, with Odds Ratios and 95% Confidence Intervals,  
Families Where the Biological Father Was Still Living with the Family at the 3-year Assessment Only (n = 4,729)

| DAWBA diagnoses       | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|-----------------------|------------------|------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Any disorder          | Unadjusted model | 1.41 [.85, 2.36], p=.187     | 0.98 [.57, 1.68], p=.951      | <b>2.15 [1.41, 3.27], p&lt;.001</b>  | 0.70 [.34, 1.43], p=.323        | 1.52 [.80, 2.87], p=.199               | <b>2.18 [1.13, 4.21], p=.020</b>        |
|                       | Model 1          | 1.39 [.83, 2.33], p=.207     | 0.96 [.56, 1.64], p=.867      | <b>2.12 [1.39, 3.23], p=.001</b>     | 0.69 [.33, 1.41], p=.305        | 1.52 [.80, 2.88], p=.199               | <b>2.22 [1.15, 4.28], p=.018</b>        |
|                       | Model 2          | 1.34 [.80, 2.26], p=.264     | 0.90 [.52, 1.55], p=.710      | <b>1.84 [1.19, 2.83], p=.006</b>     | 0.67 [.32, 1.39], p=.282        | 1.37 [.72, 2.62], p=.343               | <b>2.04 [1.05, 3.97], p=.036</b>        |
|                       | Model 3          | 1.34 [.80, 2.26], p=.268     | 0.81 [.47, 1.40], p=.451      | <b>1.83 [1.18, 2.83], p=.007</b>     | 0.60 [.29, 1.25], p=.176        | 1.36 [.71, 2.61], p=.354               | <b>2.26 [1.15, 4.43], p=.018</b>        |
|                       | Model 4          | 1.29 [.75, 2.21], p=.362     | 0.76 [.43, 1.34], p=.337      | 1.65 [.96, 2.85], p=.070             | 0.59 [.28, 1.24], p=.164        | 1.29 [.64, 2.57], p=.477               | <b>2.18 [1.08, 4.43], p=.030</b>        |
| Behavioural disorders | Unadjusted model | 1.26 [.65, 2.42], p=.495     | 1.11 [.59, 2.08], p=.741      | <b>2.02 [1.20, 3.39], p=.008</b>     | 0.88 [.37, 2.12], p=.783        | 1.61 [.72, 3.59], p=.248               | 1.82 [.83, 3.96], p=.134                |
|                       | Model 1          | 1.24 [.64, 2.39], p=.522     | 1.08 [.58, 2.02], p=.814      | 1.99 [1.18, 3.35], p=.010            | 0.87 [.36, 2.09], p=.755        | 1.60 [.72, 3.59], p=.251               | 1.84 [.84, 4.03], p=.125                |
|                       | Model 2          | 1.19 [.61, 2.32], p=.602     | 1.01 [.54, 1.90], p=.972      | 1.67 [.98, 2.85], p=.059             | 0.85 [.35, 2.06], p=.715        | 1.40 [.62, 3.17], p=.419               | 1.65 [.75, 3.65], p=.213                |
|                       | Model 3          | 1.20 [.62, 2.33], p=.588     | 0.93 [.49, 1.75], p=.811      | <b>1.74 [1.02, 2.97], p=.041</b>     | 0.77 [.32, 1.87], p=.565        | 1.45 [.64, 3.28], p=.369               | 1.89 [.85, 4.17], p=.117                |
|                       | Model 4          | 1.26 [.64, 2.50], p=.501     | 0.93 [.48, 1.79], p=.827      | <b>2.09 [1.10, 3.97], p=.025</b>     | 0.74 [.30, 1.81], p=.504        | 1.65 [.70, 3.88], p=.250               | 2.25 [.98, 5.15], p=.056                |
| Emotional disorders   | Unadjusted model | 1.24 [.57, 2.70], p=.587     | 0.71 [.29, 1.75], p=.452      | <b>2.17 [1.20, 3.92], p=.010</b>     | 0.57 [.18, 1.82], p=.342        | 1.75 [.68, 4.47], p=.243               | <b>3.07 [1.09, 8.75], p=.036</b>        |
|                       | Model 1          | 1.22 [.56, 2.65], p=.624     | 0.69 [.28, 1.71], p=.420      | <b>2.16 [1.19, 3.91], p=.011</b>     | 0.57 [.18, 1.81], p=.338        | 1.78 [.69, 4.56], p=.230               | <b>3.14 [1.10, 8.96], p=.032</b>        |
|                       | Model 2          | 1.18 [.54, 2.58], p=.681     | 0.65 [.26, 1.62], p=.357      | <b>1.90 [1.04, 3.46], p=.036</b>     | 0.55 [.17, 1.78], p=.321        | 1.61 [.63, 4.15], p=.322               | <b>2.91 [1.02, 8.33], p=.046</b>        |

# Appendix D

| DAWBA diagnoses   | Regression model | Non-anxious vs prenatal only | Non-anxious vs postnatal only | Non-anxious vs anxious-at-both-times | Prenatal only vs postnatal only | Prenatal only vs anxious-at-both-times | Postnatal only vs anxious-at-both-times |
|-------------------|------------------|------------------------------|-------------------------------|--------------------------------------|---------------------------------|----------------------------------------|-----------------------------------------|
| Anxiety disorders | Model 3          | 1.17 [.53, 2.58], p=.697     | 0.54 [.22, 1.37], p=.195      | 1.74 [.94, 3.22], p=.078             | 0.47 [.14, 1.51], p=.203        | 1.49 [.57, 3.88], p=.417               | <b>3.19 [1.10, 9.26], p=.033</b>        |
|                   | Model 4          | 1.00 [.44, 2.27], p=.995     | 0.48 [.19, 1.24], p=.130      | 1.18 [.53, 2.64], p=.688             | 0.48 [.14, 1.61], p=.235        | 1.18 [.42, 3.34], p=.751               | 2.45 [.80, 7.54], p=.117                |
|                   | Unadjusted model | 1.30 [.60, 2.84], p=.504     | 0.74 [.30, 1.84], p=.519      | <b>2.28 [1.26, 4.13], p=.007</b>     | 0.57 [.18, 1.82], p=.342        | 1.75 [.68, 4.47], p=.243               | <b>3.07 [1.08, 8.75], p=.036</b>        |
|                   | Model 1          | 1.27 [.58, 2.77], p=.547     | 0.72 [.29, 1.79], p=.481      | <b>2.28 [1.26, 4.13], p=.007</b>     | 0.57 [.18, 1.82], p=.340        | 1.79 [.70, 4.60], p=.223               | <b>3.16 [1.11, 9.01], p=.032</b>        |
|                   | Model 2          | 1.25 [.57, 2.73], p=.583     | 0.69 [.28, 1.71], p=.424      | <b>2.02 [1.11, 3.67], p=.022</b>     | 0.55 [.17, 1.78], p=.321        | 1.62 [.63, 4.16], p=.317               | <b>2.92 [1.02, 8.36], p=.046</b>        |
|                   | Model 3          | 1.23 [.55, 2.71], p=.615     | 0.56 [.22, 1.42], p=.223      | 1.80 [.97, 3.35], p=.062             | 0.46 [.14, 1.50], p=.198        | 1.47 [.56, 3.84], p=.430               | <b>3.20 [1.10, 9.28], p=.033</b>        |
|                   | Model 4          | 1.08 [.48, 2.48], p=.847     | 0.52 [.20, 1.35], p=.182      | 1.32 [.59, 2.98], p=.499             | 0.48 [.14, 1.61], p=.236        | 1.22 [.43, 3.46], p=.709               | 2.53 [.82, 7.80], p=.107                |

*Note.* The first group in each contrast was the reference group in the analyses. p-values have not been corrected for multiple-hypothesis testing.

Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, paternal anxiety in the Crown-Crisp Experiential Index at 73 months, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal and paternal history of severe depression and other psychiatric problems).

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

DAWBA = Development and Wellbeing Assessment - Parent Questionnaire.

Table D9 Paternal Anxiety and Outcomes at 42 and 91 Months, Using Continuous Anxiety Scores as Predictors

| Subscale of RRPSPC                     | Regression models | Paternal prenatal anxiety (continuous score) as predictor <sup>a</sup> | Paternal postnatal anxiety (continuous score) as predictor <sup>b</sup> | DAWBA diagnoses       | Regression models | Paternal prenatal anxiety (continuous score) as predictor <sup>a</sup> | Paternal postnatal anxiety (continuous score) as predictor <sup>b</sup> |
|----------------------------------------|-------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------|-------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Total problems (behavioural/emotional) | Unadj model       | <b>1.07 [1.04, 1.10], p&lt;.001</b>                                    | <b>1.07 [1.04, 1.10], p&lt;.001</b>                                     | Any disorder          | Unadj model       | <b>1.06 [1.02, 1.10], p=.004</b>                                       | <b>1.06 [1.02, 1.10], p=.003</b>                                        |
|                                        | Model 1           | <b>1.07 [1.04, 1.10], p&lt;.001</b>                                    | <b>1.07 [1.04, 1.10], p&lt;.001</b>                                     |                       | Model 1           | <b>1.05 [1.01, 1.10], p=.006</b>                                       | <b>1.06 [1.02, 1.10], p=.005</b>                                        |
|                                        | Model 2           | <b>1.05 [1.01, 1.08], p=.006</b>                                       | <b>1.04 [1.00, 1.07], p=.037</b>                                        |                       | Model 2           | <b>1.04 [1.00, 1.08], p=.041</b>                                       | 1.04 [1.00, 1.08], p=.070                                               |
|                                        | Model 3           | <b>1.04 [1.01, 1.07], p=.007</b>                                       | <b>1.04 [1.00, 1.07], p=.033</b>                                        |                       | Model 3           | 1.03 [.99, 1.08], p=.087                                               | 1.03 [.98, 1.07], p=.219                                                |
|                                        | Model 4           | 1.02 [.99, 1.06], p=.253                                               | 1.01 [.97, 1.05], p=.526                                                |                       | Model 4           | 1.01 [.96, 1.06], p=.821                                               | 0.99 [.94, 1.05], p=.800                                                |
| Behavioural problems*                  | Unadj model       | <b>1.04 [1.01, 1.07], p=.003</b>                                       | <b>1.06 [1.03, 1.09], p&lt;.001</b>                                     | Behavioural disorders | Unadj model       | <b>1.06 [1.01, 1.11], p=.021</b>                                       | <b>1.06 [1.01, 1.11], p=.016</b>                                        |
|                                        | Model 1           | <b>1.04 [1.01, 1.07], p=.005</b>                                       | <b>1.06 [1.03, 1.09], p&lt;.001</b>                                     |                       | Model 1           | <b>1.05 [1.00, 1.10], p=.033</b>                                       | <b>1.06 [1.01, 1.11], p=.028</b>                                        |
|                                        | Model 2           | 1.02 [.99, 1.05], p=.151                                               | <b>1.04 [1.01, 1.07], p=.021</b>                                        |                       | Model 2           | 1.04 [.99, 1.09], p=.121                                               | 1.03 [.98, 1.08], p=.191                                                |
|                                        | Model 3           | 1.02 [.99, 1.05], p=.133                                               | <b>1.04 [1.01, 1.07], p=.007</b>                                        |                       | Model 3           | 1.03 [.99, 1.08], p=.156                                               | 1.03 [.98, 1.08], p=.266                                                |
|                                        | Model 4           | 1.01 [.98, 1.05], p=.372                                               | <b>1.04 [1.00, 1.07], p=.025</b>                                        |                       | Model 4           | 1.02 [.97, 1.09], p=.414                                               | 1.01 [.95, 1.08], p=.731                                                |
| Emotional problems                     | Unadj model       | <b>1.05 [1.02, 1.09], p=.003</b>                                       | <b>1.05 [1.01, 1.09], p=.011</b>                                        | Emotional disorders   | Unadj model       | <b>1.06 [1.00, 1.12], p=.036</b>                                       | <b>1.06 [1.00, 1.13], p=.034</b>                                        |
|                                        | Model 1           | <b>1.06 [1.03, 1.10], p=.001</b>                                       | <b>1.06 [1.02, 1.10], p=.003</b>                                        |                       | Model 1           | <b>1.06 [1.00, 1.12], p=.042</b>                                       | <b>1.06 [1.00, 1.13], p=.040</b>                                        |
|                                        | Model 2           | <b>1.04 [1.00, 1.08], p=.039</b>                                       | 1.03 [.99, 1.07], p=.140                                                |                       | Model 2           | 1.05 [.99, 1.11], p=.109                                               | 1.05 [.99, 1.11], p=.141                                                |
|                                        | Model 3           | 1.03 [.99, 1.07], p=.112                                               | 1.02 [.98, 1.06], p=.335                                                |                       | Model 3           | 1.03 [.98, 1.10], p=.253                                               | 1.02 [.96, 1.08], p=.587                                                |
|                                        | Model 4           | 1.00 [.96, 1.04], p=.988                                               | 0.99 [.94, 1.03], p=.630                                                |                       | Model 4           | 0.99 [.92, 1.07], p=.875                                               | 0.98 [.90, 1.06], p=.539                                                |
|                                        |                   |                                                                        |                                                                         | Anxiety disorders     | Unadj model       | <b>1.07 [1.01, 1.13], p=.016</b>                                       | <b>1.07 [1.01, 1.13], p=.029</b>                                        |
|                                        |                   |                                                                        |                                                                         |                       | Model 1           | <b>1.07 [1.01, 1.13], p=.019</b>                                       | <b>1.07 [1.01, 1.13], p=.033</b>                                        |
|                                        |                   |                                                                        |                                                                         |                       | Model 2           | <b>1.06 [1.00, 1.12], p=.050</b>                                       | 1.05 [.99, 1.11], p=.110                                                |

## Appendix D

| Subscale of RRPSPC | Regression models | Paternal prenatal anxiety (continuous score) as predictor <sup>a</sup> | Paternal postnatal anxiety (continuous score) as predictor <sup>b</sup> | DAWBA diagnoses | Regression models | Paternal prenatal anxiety (continuous score) as predictor <sup>a</sup> | Paternal postnatal anxiety (continuous score) as predictor <sup>b</sup> |
|--------------------|-------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------|-------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|
|                    |                   |                                                                        |                                                                         |                 | Model 3           | 1.04 [.98, 1.11], $p=.160$                                             | 1.02 [.96, 1.08], $p=.572$                                              |
|                    |                   |                                                                        |                                                                         |                 | Model 4           | 1.02 [.94, 1.09], $p=.676$                                             | 0.99 [.91, 1.07], $p=.789$                                              |

*Note.* Model 1 was adjusted for sociodemographic variables that were significantly different between the groups of comparison (i.e., number of other children, father marital status).

Model 2 was adjusted for child temperament (assessed via the Carey Infant Temperament Scale).

Model 3 was adjusted for maternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, maternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal history of severe depression and other psychiatric problems).

Model 4 was adjusted for maternal and paternal current and past mental health (maternal anxiety in the Crown-Crisp Experiential Index at 18-week prenatal, 8-week postnatal and 73 months, paternal anxiety in the Crown-Crisp Experiential Index at 73 months, maternal and paternal depression in the Edinburgh Postnatal Depression Scale at 18-week prenatal, 8-week postnatal and 73 months, maternal and paternal history of severe depression and other psychiatric problems). The 73-month scores assessments were not included in the adjusted models for the RRPSPC outcomes.

In the adjusted models, missing values in covariates are imputed via multiple imputation.

Significant results are in bold ( $p < .05$ ).

\*Scale created by the authors, considering those who scored in the top 10% in the conduct and/or hyperactivity scales.

<sup>a</sup> Measured via the anxiety subscale of the Crown-Crisp Experiential Index at 18-week prenatal

<sup>b</sup> Measured via the anxiety subscale of the Crown-Crisp Experiential Index at 8-weeks postnatal  
RRPSPC = Revised Rutter Parent Scale for Preschool Children; DAWBA = Development and Wellbeing Assessment - Parent Questionnaire.

## Appendix E Supplementary Material for Chapter 4

### E.1 Study Advertisement

**NHS SC.DTP** South Coast Doctor Training Partnership **UKRI** Economic and Social Research Council **University of Southampton**

**ARE YOU A PARENT WITH LIVED EXPERIENCE OF ANXIETY WHO HAD NHS PSYCHOLOGICAL THERAPY FOR ANXIETY?**

**TAKE PART IN OUR PROMOTE STUDY**

**Aimed at promoting the mental health of preschool-age children whose parents have been affected by anxiety**

To take part, you need to:

- ✓ Be a parent (aged 18+) of a child (18 months+) who has not yet started primary school
- ✓ Have lived experience of an anxiety disorder or impairment caused by anxiety
- ✓ Have recovered from the impact of the anxiety or feel that anxiety no longer has a significant impact on your life
- ✓ Have completed an NHS psychological therapy for the anxiety
- ✓ Be a resident in the UK
- ✓ Be able to have an online interview (e.g., have a device with internet access)

**What would you want following your psychological therapy to support you to promote your child's mental health?**

**We want to hear from you!**

**You will receive a £25 Amazon Voucher following a 30 mins to 1 hour online interview**

Please get in touch if you are interested or would like more information  
**F.Zecchinato@soton.ac.uk**

Or scan the QR code

Take down by 30/06/2024 ERGO ID: 84929 v1 08/08/2023 IRAS ID: 331503

Figure F1 Poster Used to Advertise the Study

## **E.2 Indicative Topic Guide for Qualitative Interview**

### **E.2.1 Proposed Interview Schedule**

**Starting the interview:** Orienting the participant to understanding the aim of the interview (the parent' thoughts on stopping their anxiety being a problem for their preschool child and on promoting their child's mental health) and time for questions to clarify this.

**Summary Topic Guide:**

- Questions about the parent's thoughts on stopping their anxiety being a problem for their preschooler (would they want a service with this aim? When? What would make this service accessible and usable?);
- Questions about any concerns for their children's mental health that are related to their own anxiety;
- Questions about barriers to access help to prevent negative outcomes in their children.

**Debrief**

**End of interview.**

### **E.2.2 Indicative Topic Guide for Parents**

This interview will focus on your thoughts on promoting your pre-schooler's mental health.

- In addition to IAPT/NHS talking therapies, did you access other services for the anxiety that was a problem for you? If so, which kind of services did you access?
- How did you access these services (e.g., what did you need to do to access the service, what/who helped you)?

What we are most interested in finding out from you is your thoughts on promoting your child's good mental health and stopping the anxiety difficulties you experienced having a negative impact on them.

- What are your thoughts about any potential impact of your anxiety on your child's mental health?

[prompts that may be used to have more detailed information, depending on the participant's answer. We do not intend to trigger worries if the parents have no concerns – if this is the case, we will move to the next question. For example, do you have any concerns about your child developing emotional or behavioural difficulties? Do you have any concerns about worry, shyness, fear or anxiety becoming a problem for your child? Do you have any concerns about your child developing behavioural problems (e.g., attention problems, hyperactivity, conduct problems etc.)? Can you tell me why you think your child might be at risk (e.g., genetics, environment)?]

- What are your thoughts about your anxiety impacting or getting in the way of parenting your child?
  - Can you tell me more or provide an example of a time when that happened?
- Besides therapy, have you already done something / taken any measures to try to stop your anxiety becoming a problem for your children?
  - Can you tell me more?
- What would you think about the idea of some kind of NHS service to support you to prevent your anxiety difficulties having negative impacts on the development of your pre-schooler?
  - How could a service support you? What would you need?
  - What would you want from this type of service?
  - When would you want it (with prompts, such as straight after IAPT service / not until thought child might show signs of emotional or behavioural difficulties / when or if someone else flags up any difficulties experienced or manifested by your pre-schooler)? Why (motivate the answer provided)?
  - What would help you gain access to the service?

- What would help you use the service (e.g., would you like an online or in person service? Would you use an app? In which setting and format would you like it to be delivered?)? Why (motivate the answer provided)?
- Would you have any concerns on using this type of services aimed at stopping your anxiety having a negative impact on your preschooler?
  - What do you think might stop you or other parents (who are concerned) from accessing information/help to minimise the risk of your/their anxiety becoming a problem in your/their preschoolers?
- Are there specific things that you think might help overcome these concerns or barriers?

Is there anything else that you wanted to talk about relevant to the topic of discussion?

The interview is finished. I will now read a debriefing form for you, which I will also send to you via email.

### **E.3 Reflexivity Statement**

The lead researcher is a White European woman currently conducting her PhD at the University of Southampton, focused on the prevention of mental ill-health in children and on the impact of parental anxiety on child mental health outcomes. She is not a parent. She has experience with accessing mental health services, including NHS talking therapies, for anxiety-related difficulties. The lead researcher was supported throughout the project by a team of two supervisors, both academics with a background in child and adolescent and adult mental health, and one of them is also a clinical psychologist. Both supervisors had experience of conducting and supervising projects related to parental anxiety and intergenerational risk transmission.

For the duration of the project, the supervisory team frequently met with the lead researcher, both individually and as a group, to discuss and reflect on how their experiences, values, beliefs, and identities influenced how the project was approached and conducted. To practice and maintain reflexivity between supervisory meetings, the lead researcher kept a reflexive diary. An advisory group of parents with lived experience of anxiety and a clinical service lead, created by the lead researcher, was also consulted throughout the project. The group comprised up to three parents with current or historic experience of anxiety, and an NHS clinical service lead with experience of working with parents experiencing mental health difficulties, who provided valuable input regarding the development of the study materials, the analysis and interpretation of the data, and the general discussion. Three members of the advisory group contributed to the write up and are included in the paper as co-authors.

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