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THE ROLE OF THE FAMILY ENVIRONMENT AND OF THREAT-RELATED
COGNITIVE BIASES IN CHILDHOOD ANXIETY

by

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ABSTRACT

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THE ROLE OF THE FAMILY ENVIRONMENT AND OF THREAT-RELATED
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The thesis investigates cognitive and family factors linked to childhood anxiety in a non-referred population taking a developmental approach. It examines whether children with symptoms of anxiety exhibit a threat-related cognitive bias. Attentional and interpretive biases are specifically looked at. It also examines maternal variables that would be influential to the child's levels of anxiety. Maternal parenting behaviours, maternal mental health and maternal beliefs and attitudes towards the child are specifically looked at. Cognitive and maternal factors are integrated in the explanation of childhood anxiety. Whether links between maternal factors and childhood anxiety are mediated by the development of biased cognitive styles is explored.

A total of 129 children aged 7-14 years and their mothers participated in the study. Children are assessed on cognitive tasks tapping into attentional and interpretive biases. Their levels of anxiety are assessed with questionnaire reports completed by themselves and their mothers. Maternal parenting behaviours and maternal mental health variables are assessed with questionnaire reports completed by the mothers. Maternal beliefs and attitudes towards the child are assessed with the Expressed Emotion index following five minute interviews.

The results show that children with symptoms of anxiety exhibit a threat-related cognitive bias. In support of developmental theories of cognition and anxiety, threat-related attentional biases (ABs) emerged for children aged over 10 years. The results also single out maternal variables that are contributing to a child's anxiety. The association between maternal parenting behaviours or maternal beliefs and attitudes and a child's anxiety however is shown to not be consistent. In contrast maternal depression is found to be consistently associated with a child's symptoms of separation anxiety independent of the age of the child. Support for a cognitive mediated pathway in which threat-related ABs are partially mediating a link between maternal overprotection and a child's separation anxiety is found. These findings add to developmental models of childhood anxiety and indicate possible pathways via which maternal variables could be enhancing a child's anxiety.

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ABBREVIATIONS

ΔR^2	R square change
AB	Attentional Bias
ABs	Attentional Biases
AD	Anxiety Disorders
ANOVA	Analysis of Variance
ANS	Autonomic Nervous System
ANT	Attention Network Task (ANT)
APPQ	Albany Panic and Phobia Questionnaire
B	Beta value
BAI	the Beck's Anxiety Inventory and the
BDI-II	The revised Beck's Depression Inventory
BI	Behavioural Inhibition
CMM	Cognitive Motivational Model
CR	Conditioned Response
CS	Conditioned stimulus
DPT	Dot Probe Task
DSM –IV-TR	Diagnostic and Statistical Manual of Mental Disorders
DV	Dependent Variable
EC	Effortful Control
EE	Expressed Emotion
ER	Emotion Regulation
EST	Emotional Stroop Task
F	F ratio
FEAR	Family Enhancement of Avoidant Responses
FMSS	Five Minute Speech Sample
GAD	Generalised Anxiety Disorder
GES	Goal Engagement System
GFI	Goodness-of-Fit Index
IC	Inhibitory Control
I-P	Information Processing
IV	Independent Variable
K	inter-rater reliability
KFQ	Koala Fear Questionnaire
I ESI I	Absolute value derived from a Emotional Stroop Task
M	Mean

MANOVA	Multivariate
MDPT.	Modified Dot Probe Task
MHWG	Mental Health Working Group
mm	millimetres
ms	milliseconds
N	Number of Participants
NA/N	Negative Affectivity/Neuroticism
ns	Non significant
OCD	Obsessive-Compulsive Disorder
p	probability
PA	Positive Affectivity
PCIT	Parent-Child Interaction Therapy
PD	Panic Disorder
PSDQ	The Parenting Styles and Dimensions Questionnaire-
PTSD	Post-Traumatic Stress Disorder
r	Correlation Coefficient
r	Internal Consistency Coefficient
R^2	R square
RCADS	The Revised Child Anxiety and Depression Scales – Child Version
RCADS-P	The Revised Child Anxiety and Depression Scales - Parent Version
RCMAS	Revised Children's Manifest Anxiety Scale
RED	Reduced Evidence for Danger
r_s	Spearman's correlation coefficient
RT/RTs	Reaction Time/Reaction Times
SAD	Separation Anxiety Disorder
SD	Standard Deviation
SE	Standard Error
SEM	Structural Equation Modelling
Sig.	Significance
STAI	State - Trait Anxiety Inventory for adults
STAIC	The State-Trait Anxiety Inventory for Children
t	t statistic
US	Unconditioned Stimulus
VES	Valence Evaluation System

WISC-III	Wechsler Intelligence Test for Children-III UK
α	Coefficient for convergent validity
η^2	Partial eta squared

CHAPTER 1
Thesis introduction and outline

Anxiety disorders (AD) are among the most prevalent forms of psychopathology experienced in childhood (Vasey & Dadds, 2001; Donovan & Spence, 2000). The Mental Health Working Group (MHWG) on Prevention Research (1995) states that the costs of anxiety both economical and personal are manifold. Specifically they highlight that anxiety problems are associated with social, emotional and academic debilitating consequences for the child and their families.

Despite the importance of anxiety problems on children's long-term adjustment (Vasey & Dadds, 2001) our knowledge on childhood anxiety is still scarce. One of the reasons that explain the limited knowledge on anxiety in children is that early models of childhood anxiety (Kendall, 1983) constituted downward extensions of adult theories (Beck, 1976; Williams, Watts, MacLeod, & Mathews, 1988, 1997). In addition, it is not until recently that theoretical models and empirical research of childhood anxiety has started to emphasize the impact of developmental issues on AD (Kindt & van den Hout, 2001; Vasey, Dalgleish & Silverman, 2003; Muris, 2006). Another impediment to the advance of the field is that work being done on cognition and childhood anxiety has mainly focused on cognitive factors operating in isolation and failing to examine the dynamics among the factors (Vasey & Dadds, 2001). Exceptions to this trend in the field are Rapee (2001) model Ginsburg and Schlossberg (2002) model and Muris and Merckelbach (2001) model. The three models propose that family and cognitive factors contribute to childhood anxiety. However whereas Rapee (2001) model and Ginsburg and Schlossberg (2002) model argue that cognitive factors could mediate the relationship between family factors and anxiety in the child, Muris and Merckelbach model (2001) highlights an independent contribution of family and cognitive factors to childhood anxiety. Research on cognitive factors and childhood anxiety has shown

that attentional and interpretive threat-related biases are associated with a child's anxiety levels (Vasey, Daleiden, Williams & Brown 1995; Vasey & MacLeod, 2001; Taghavi, Moradi, Neshat-Doost, Yule & Dalgleish, 2000). In addition, research on family factors and childhood anxiety has shown that parental factors such as parenting styles, parental mental health or a parent-child emotional relationship are associated with a child's anxiety levels (Scott, Scott & McCabe 1991; Costa & Weems, 2005; Biederman et al. 2006).Interestingly there has been a remarkable increase in the empirical investigation of the influence of family factors on the child's anxious-related cognitive processes (Chorpita, Albano & Barlow, 1996; Bögels, van Dongen & Muris, 2003; Grych, Raynor & Fosco, 2004). Nevertheless there is a need to ascertain pathways via which family factors could be impinging on children's anxiety. Further research is warranted to examine whether family factors could be enhancing a child's attentional and interpretive threat-related bias augmenting in turn his/her levels of anxiety. This line of research is supported by the cognitive-mediated pathway outlined in recent theoretical models on childhood anxiety (Rapee, 2001; see also Hudson & Rapee, 2004).

This thesis investigates the influence of cognitive and parental factors on the child's levels of anxiety within a developmental framework. Based on empirical work an attempt to identify possible pathways via which parents could be transmitting anxiety onto the child is made. Specifically the feasibility of possible pathways via which the child's anxious cognitions could be mediating the relationship between parental factors and the child's anxiety is explored. One pathway explored is whether threat-related ABs could be mediating the link between parental factors and the child's anxiety. It is also explored whether threat-related interpretive biases could be mediating the link between parental factors and the child's anxiety.

In Study 1, two cognitive factors found to be linked to anxiety both in adults (Mogg & Bradley, 1999; Eysenck, MacLeod & Mathews, 1987) and children (Vasey & MacLeod, 2001; Muris, Luermans, Merckelbach & Mayer, 2000; Muris, Merckelbach & Damsma, 2000) are investigated. These are

attentional and interpretive biases. In addition three parental factors that have been found to contribute to the child's anxiety are investigated. These are parenting styles, parental mental health and parental beliefs and attitudes towards the child. The quality of a parent-child emotional relationship is also considered.

Study 2 builds on Study 1 to explore the influence of maternal factors on a specific anxious symptomatology in the child. Although paternal factors also play an important role in children's upbringing (Bögels & Brechman-Toussaint 2006) only maternal factors are taken into consideration. The rationale for doing so is that the availability of the fathers was very limited in Study 1. The results of Study 1 indicated that maternal depression contributes to the child's separation anxiety. An association between parental depression and the child's separation anxiety had already been found (Biederman et al. 2001). The authors also found a link between parental panic anxiety and an increase risk for separation anxiety disorder in the offspring (Bierderman et al. 2001). A link between parental panic/phobic anxiety and separation anxiety in the child has been outlined in a later study (Bierderman et al. 2004). Based on this empirical work, in Study 2 maternal depression and panic/phobic anxiety are explored in their relationship with separation anxiety in the offspring. To increase the range of panic/phobic anxiety and depression in the mothers, offspring of high-risk mothers are included in the sample.

The thesis is organised into 7 chapters. Chapter 2 consist of a literature review. In Chapter 2 cognitive theoretical models and empirical work on childhood anxiety is presented and discussed from a developmental perspective. In addition etiological models of childhood anxiety are explained and discussed focusing on parental pathways that could contribute to the disorder. Empirical evidence of the association between parental factors and anxiety throughout childhood is presented and evidence for the link between parental factors and a child's anxious cognitive style is also demonstrated. Chapter 3 is a methodological chapter. It includes a description of the PhD process and the sampling and it also

explains the design and methodological rationale of the thesis. Chapter 4 focuses on threat-related cognitive biases and describes the relationship between attentional and interpretive biases and childhood anxiety measures. Chapter 5 focuses on parental factors and describes the relationship between parental childrearing practices, parental psychopathology and childhood anxiety measures. Chapter 6 explores possible pathways via which parents could be transmitting anxiety to the child, specifically it examines the viability of a cognitive mediated pathway. In Chapter 7 the theoretical and empirical implications of the findings are discussed including directions for future work.

CHAPTER 2
Review of the Literature

2.1 Overview

This chapter reviews Information Processing (I-P) biases that have been linked to AD in adults and children. It also reviews family factors that have been associated with AD in children. The chapter starts with a brief explanation of normal and pathological anxiety. In the following sections the emergence of I-P biases in childhood anxiety is considered from a developmental approach and age-related differences are taken into account in the expression of anxiety. Theoretical perspectives on the co-occurrence of anxiety and depression are also presented.

2.2 Typical and Pathological Anxiety in Childhood

Spielberger (1972) defined anxiety as subjective, consciously perceived feelings of tension and apprehension and associated activation of the autonomic nervous system (ANS). Specifically he considered different dimensions within the anxiety construct: a cognitive dimension (conscious apprehension) and a physiological dimension (activation of the ANS). In addition he distinguished trait from state anxiety. An anxiety state is evoked whenever a person perceives a particular situation as potentially harmful or threatening to him. An anxiety state varies in intensity and fluctuates over time depending on the amount of stress perceived by the individual. In contrast, trait anxiety is relatively stable and refers to anxiety proneness as a personality trait. Other definitions of anxiety are suggestive of the multidimensional nature of anxiety. For example Lazarus and Averill (1972) defined anxiety as "an emotion based on the appraisal of threat, an appraisal that entails symbolic, anticipatory, and uncertain elements. Anxiety results when cognitive systems no longer enable a person to relate meaningfully to the world about him". This definition highlights the complexity of an anxious phenomenon in which not only a cognitive appraisal of threat is involved, but also an emotional reaction that includes

behavioural and physiological manifestations. The complexity of the anxiety construct is further acknowledged by Fremouw and Gross (1983). They posit that understanding anxiety as a unitary construct is both inefficient and inappropriate. Further evidence of the complex nature of anxiety is found in the identification of fear and worry as two distinct constructs within the anxiety phenomena. Fear can be conceptualized as a closely related feeling that arises from a normal response to a realistic threat obvious to the observer, such as a tiger (Marks et al. 2001). Worry can be conceptualized as an unpleasant feeling that occurs in the absence of an actual danger, it is mainly concerned with thinking about future threat-related scenarios (Muris, Merckelbach & Luijten 2002). Fear and worry can lead to a non-adaptive reaction; when the child perceives a threat as a source of extreme danger and his/her reaction to it is exaggerated. The child would then experience overwhelming cognitions around themes of threat or danger and debilitating increases in the activity of the autonomic nervous system leading to physiological arousal – i.e. increases in heart rate. This cognitive and physiological reaction could lead to behavioural avoidance (Clark & Wells, 1995). The persistence of this non-adaptive reaction over time could place the child at risk of developing pathological anxiety, in other words an AD. Children would be experiencing an AD when their non-adaptive reaction persisted for more than 6 months, is beyond voluntary control and interferes with social, emotional or academic functioning. In addition, this non-adaptive reaction would be triggered by fearful or worrisome stimuli not connected with the child's age or developmental stage (Miller 1983, DSM-IV-TR, 2000)

There have been different attempts to classify AD. The latest version of the Diagnostic and Statistical Manual of Mental Disorders (DSM –IV-TR, 2000) lists the following: panic disorder (PD), agoraphobia, specific and social phobia ,obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), acute stress disorder, generalised anxiety disorder (GAD), AD due to medical condition, substance induced AD, and AD not otherwise specified. It lists only one AD specific to childhood anxiety: separation anxiety disorder (SAD). It should be clarified that social phobia is also

referred to as social anxiety as it constitutes an anxiety disorder characterised by an abnormal fear of an everyday object or situation.

Anxiety is becoming an increasingly common phenomenon in the child general population (Donovan & Spence, 2000; Beidel & Turner, 2005). In fact anxious symptoms have been found to be present not only in children diagnosed with an AD, but also in non-referred children (Bell-Dolan, Last & Strauss, 1990).Further evidence suggests that SAD is one of the most prevalent disorders in childhood, specifically in children aged below 12 years (Costello et al. 2003; Cartwright-Hatton, McNicol & Doubleday, 2006). SAD is characterised as an intense fear of separation from the caretaking figure, which can cause a great deal of distress and lead to avoidant behaviour (Casat, 1988;Masi, Mucci & Millepiedi, 2001;Jurbergs & Ledley, 2005).

Weems (2005) states that the current diagnostic criterion is in need of revision as the classification system may be inadequate. For example the DSM IV-TR (2000) lists SAD as a distinct AD which is specific to childhood anxiety. Westenberg, Siebelink and Treffers (2001), however, raise the possibility that SAD is not a distinct disorder but is part of a developmental process that leads to AD. Several studies have attempted to shed light on this question. Otto et al. (2001), for example, found that SAD is linked to a variety of anxiety disorders in adulthood. For example SAD has been linked to adult PD and agoraphobia (Manicavasagar, Silove & Hadzi-Pavlovic, 1998). Age at onset for PD is most typically between late adolescent and the mid-30s. Little is known about the age at onset for agoraphobia (DSM-IV-TR, 2000). Uncertainty still persists about the natural course of SAD and its developmental link to adult anxiety disorders. In fact there are no well defined etiological pathways outlining continuity and change for childhood AD (Weems & Costa, 2005). However researchers are increasingly focusing on developmental continuity among the AD and the next section examines their empirical work.

2.3 The Developmental Course of Anxiety Disorders

One of the major tenets of developmental psychopathology is that it occurs in a developing organism (Davies & Cicchetti, 2004). Therefore in order to understand the etiology and maintenance of childhood anxiety it is necessary to consider the developmental changes that occur during childhood. These developmental changes are involved in the manifestation of anxiety phenomena (Muris, 2006).

Most children experience a variety of fears during their development (Ollendick, King & Muris, 2002) Most of these fears do not involve extreme reactions. In addition they are age specific and transitory. Hence it has been observed that at a very young age fear of loud noises, loss of support and of separation anxiety from the mother are common. In 4 year-olds fear of darkness prevails. Around 5 to 6 years of age social fears emerge. Fears remain relatively constant when children reach 6 years of age up to adolescence. Within that age range fears are primarily related to injury, natural events and social situations (Ollendick, Matson & Helsel, 1985). It is possible that fears can develop into worries. From 7 years of age onwards, children are able to anticipate potential threatening events, which is likely to enhance their ability to worry (Muris et al. 2002). In fact worry is a common phenomenon among children (Laugasen, Dugas & Bukowski, 2003). For example social worries have been reported in children as young as 7 years of age (Spence, Donovan & Brechman-Toussaint, 1999). Interestingly, although social worries increase throughout childhood to reach a high prevalence rate in adolescence (Ollendick & Hirshfeld-Becker, 2002), worries related to separation from the mother figure should decrease in children older than 10 years (Bell-Dolan et. al., 1990; Costello et al. 2003).

Children between the ages of 7 and 10 years experiencing increasing levels of fear could go on to develop an AD, because it is within this age range where there should be a decrease in typical childhood fears (Ollendick, King & Frary, 1989). In line with this argument, some studies have found that increasing levels of anxiety throughout childhood can lead

to AD in adolescence, augmenting the risk of developing an AD in adulthood (Pollak et al. 1996). Moreover the continuation of an anxious symptomatology can lead to an anxious/depressive symptomatology in adolescence (Reinherz et al. 1993). In fact, converging research shows that anxiety can precede depression and that the co-occurrence of an anxious depressive symptomatology endures throughout the life course (Kovacs, Gatsonis, Paulauskas & Richards, 1989; Burke, Loeber, Lahey & Rathouz, 2005).

Despite the overlap observed between symptoms of anxiety and depression are there any idiosyncratic features that could distinguish one set of symptoms from another? This is an important question to address because if a set of symptoms are identified as cardinal constituents of anxiety and not of depression, a set of cognitive distortions may also be identified as specific to anxiety and not to depression. Therefore various theoretical frameworks attempt to address this question.

2.4 The Differentiation of An Anxious Phenomenon

2.4.1 The Tripartite Model of Anxiety and Depression

Clark and Watson's (1991) tripartite model of anxiety and depression, gives support for the notion that certain temperamental dispositions are not shared by depression and anxiety. A temperamental disposition can be defined as an innate tendency of reacting and behaving in a particular way; this tendency appears to remain stable over time (Caspi 2000). Clark and Watson (1991) proposed that anxiety is characterized by high levels of Negative Affectivity (NA) and changes in the autonomic nervous system (what they refer to as Physiological Hyperarousal). In contrast they posited that depression is characterized by high levels of NA but also low levels of Positive Affectivity (PA). NA, also been termed as neuroticism, is a temperamental disposition that can be defined as a tendency to experience subjective distress across a variety of situations, even when an objective stressor is not present (Watson & Clark 1984). On

the other hand PA is a temperamental disposition that can be defined as a tendency to engage with the environment in a pleasurable way, showing signs of enthusiasm, activity and alertness. NA was, therefore, identified as a generic non-specific innate tendency shared by both anxiety and depression, lack of PA was identified as specific to depression.

2.4.2 The Helplessness and Hopelessness Perspective

Beck (1976) highlighted the role of uncontrollability regarding future events in the development of anxiety. In a review of the co-ocurrence of anxiety and depression, Mineka, Watson and Clark (1998) proposed that the perception of uncontrollability when faced with stressful life events, termed as helplessness, is linked to anxiety. In contrast, feelings of despair, loss of interest and suicidality, termed as hopelessness are linked to depression. A recent model of the aetiology of fear gives support for the link between perception of uncontrollability and fear (Armfield, 2006). Feelings of helplessness could feed into a sense of uncertainty regarding the possibility of a negative outcome, leading to feelings of hopelessness (Maltsberger & Weinberg, 2006). The individual could then start to experience mixed depression and anxiety. Whenever a negative outcome occurred feelings of hopelessness in the individual would be reinforced and their levels of depression enhanced. Hence Mineka and colleagues' work (1998) implies that depression could be a precursor of anxiety as feelings of helplessness could lead to feelings of hopelessness. This implication finds support in empirical work (Reinherz et al. 1993; Burke et al. 2005). Despite the evidence of the association between early anxiety and later depression there is a need to investigate to what extent this association is explained by shared genetic aetiology of the disorders or by the contribution of environmental factors (Rice, van den Bree & Thapar, 2004).

In relation to development, Chorpita and Barlow (1998) further corroborated the link between helplessness and anxiety. The authors heightened the role of perceived uncontrollability in the development of anxiety in childhood. They argued that an early experience of diminished

control could make the child interpret the world as out of his/her control, leading in turn to an increase in his/her anxiety levels. The literature on childhood anxiety supports this theoretical perspective, giving evidence for a relationship between a sense of diminished control and childhood anxiety (Chorpita, Brown & Barlow, 1998; Aycicegi, et al. 2002).

Cognitive distortions appear as a common theme in the helplessness and hopelessness perspective. Interestingly, the role of cognitive variables has been increasingly taken into account in both adult's and children's theoretical formulations of anxiety and depression. (Mathews & MacLeod, 1994; Schniering & Rapee, 2004). In line with this theoretical interest, burgeoning empirical work has been carried out on cognitive distortions in childhood depression and anxiety (Leung & Poon , 2001; Marien & Bell, 2004; Muris & van der Heiden 2006).

Throughout the review cognitive distortions found to be related to an anxious symptomatology will be considered. It will be also considered whether these cognitive distortions could be cognitive precursors to childhood anxiety. Due to the high co-ocurrence of anxiety and depression references to the specificity of cognitive biases in anxiety will be made. A framework that serves to explore cognitive biases and helps to understand cognitive distortions associated separately with AD or depression is the Information-Processing (I-P) Paradigm.

2.5 The Information-Processing (I-P) Paradigm

The Information-Processing (I-P) paradigm describes how information is coded, interpreted and modified through a sequence of stages as it passes through the cognitive system. It is based upon the structural and functional properties of the cognitive system (Vasey & MacLeod, 2001). The I-P Paradigm has been validated as a heuristic framework for conceptualising and investigating the role of cognitive factors underlying the aetiology and maintenance of mental health disorders such as anxiety (Vasey, Dalgleish & Silverman, 2003). With an I-P paradigm

approach, it has been observed that a threat-related cognitive bias plays a crucial role in the development and maintenance of anxiety in adulthood (Mogg & Bradley 1998; Mogg et al. 2000).

It is only recently that the I-P paradigm approach has been applied in childhood research. In addition only one I-P model has been developed from an integrative approach in an attempt to explain children's social adjustment. This model was developed by Crick and Dodge (1994). In this model cognitive factors are not treated in isolation but a detailed explanation of how the information is processed through different cognitive stages is given. Hence Crick and Dodge (1994) gave a detailed description of I-P stages involved in children's social adjustment. The authors delineated six stages in a I-P sequence: 1) Encoding; 2) Interpretation; 3) Goal clarification; 4) Response access; 5) Response decision; 6) Enactment.

In stages one and two, it is hypothesised that children selectively attend to particular external and internal cues, encoding them and interpreting them. After interpretation, children select a goal for the situation or continue with a pre-existing goal. In the fourth stage, children retrieve from memory possible responses to the situation or they may construct possible responses. In the two final stages, children select a response which is then enacted. The reviewed model accounts for a circular flow of processing. See Figure 1.
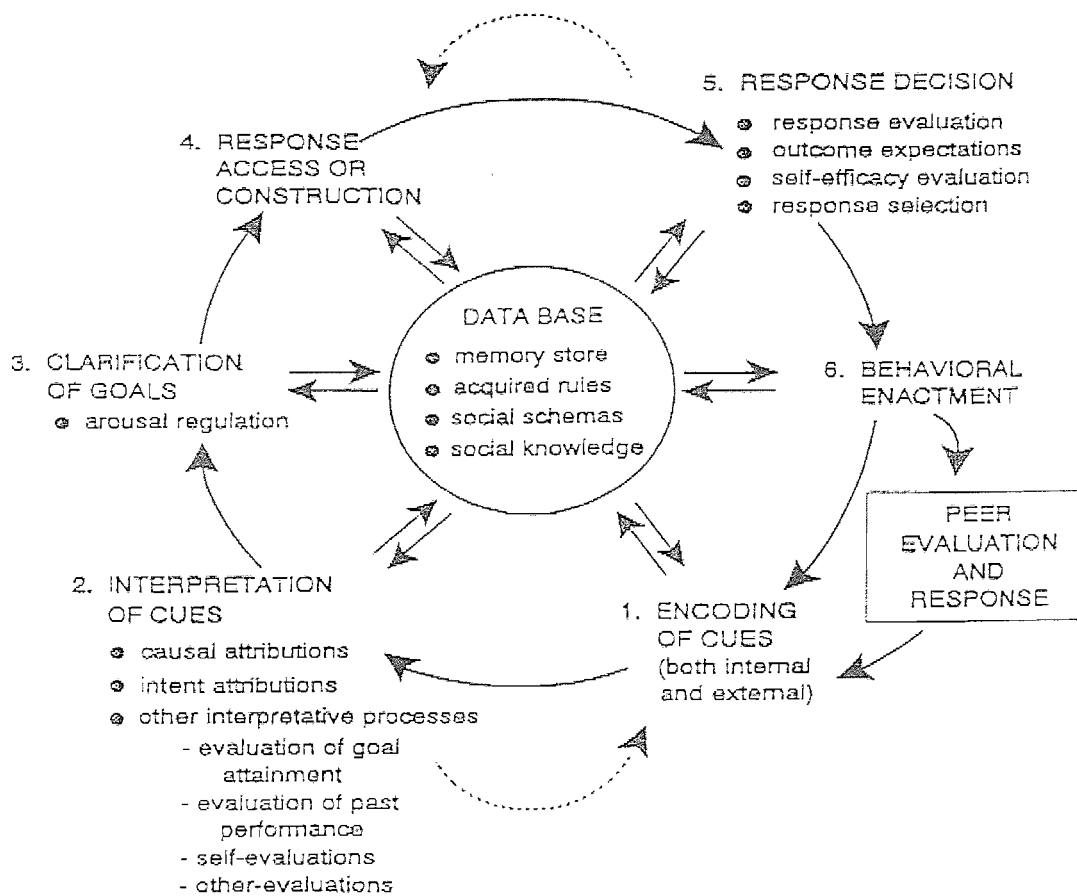
Figure 1. A social I-P model of children's social adjustment (Crick & Dodge, 1994)

The model describes the flow of information through the processing system in order to explain children's social adjustment. Nevertheless specific cognitive biases that could occur at any stage of the processing system are not explained. For example it does not explain how children's inaccurate beliefs, a cognitive bias that would occur at the interpretation stage, could contribute to children's social maladjustment (Cartwright-Hatton, Tschernitz & Gomersall, 2005). In addition anxiety is not explicitly mentioned in the model. Therefore, there is a need to develop models that describe I-P stages in detail so further insight can be obtained regarding cognitive biases and their role in childhood anxiety. In addition there is a need to understand why some research has failed to replicate in children, the association between anxiety and threat-related ABs observed in studies with adults (Vasey et al. 2003; Kindt, Bögels & Morren, 2003; Waters, Lipp & Spence, 2004). This inconsistency in the findings heightens the need of investigating cognitive biases from a developmental perspective.

2.5.1 I-P Biases: a Developmental Perspective

Empirical studies are increasingly examining cognitive biases in childhood and current theorists are starting to develop I-P theoretical models of childhood anxiety. These models consider the necessity of taking into account the development of cognitive abilities throughout childhood and adolescence. An early theoretical model of childhood anxiety that refers to I-P factors was developed by Kendall (1983). In his theory he argued that children's cognitive schemas can play a role in the development and/or maintenance of anxiety. He defined cognitive schemas as hypothetical constructs regarding a stimulus domain (i.e. dogs). In addition he specified that they consist of an ideational and affective component. The ideational component involves prototypic exemplars (i.e. shepherd dogs) and attributes (i.e. size). The affective component refers to the affective state of the individual (i.e. fear) at the time when the construct is built or retrieved from memory. Hence a child's cognitive schema in relation to a particular stimulus domain (i.e. dogs) could consist of the perception

of danger. Upon encountering the stimulus the schema could be unconsciously evoked which would provide a perception of danger regarding the stimulus (Armfield, 2006). Children prone to anxiety would be more likely to evoke threat-related schemas upon encountering stimuli and therefore would be more likely to evaluate the stimulus as threatening. In addition they would attend to information that is relevant to and congruent with their threat-related schemas.

Kendall's theory (1983) was drawn from adult research and resembles theoretical models of I-P biases in adulthood anxiety. For example Beck's (1976) model of anxiety in adults had already emphasized that a vulnerability factor for experiencing anxiety was the allocation of processing resources to threat-relevant stimuli. Despite the contribution of Kendall's theory of schemas into a further understanding of I-P variables linked to childhood anxiety, it failed to account for the developmental process of these I-P variables. Interestingly Vasey & MacLeod (2001) argued that I-P factors in children are not fully developed as they are in adults. Therefore, there is a need to ascertain which I-P factors are likely to be more relevant at different stages in development and how they may operate at each stage.

Current models of I-P biases in childhood extend Kendall's (1983) model while considering the developmental processes of threat-related I-P biases that appear to be linked to anxiety. Kindt and Van den Hout (2001), for example, developed a model that argues that what places children at risk of developing an AD is a failure to inhibit an AB to threat. They propose that this cognitive skill develops throughout childhood and starts to become evident at around 10 to 12 years of age (Kindt et al. 2003). Therefore children less than 10-12 years of age would attend to threat-related stimuli. Kindt and van den Hout (2001) argued that a typically developing child would learn to inhibit this AB as he/she grew older, a child prone to the development

of an AD would not. Kindt and Van den Hout's (2001) model adds to the understanding of the development of I-P biases linked to anxiety by identifying inhibitory control as a cognitive skill crucial in the regulation of threat-related ABs. Inhibitory control, also termed as effortul control (EC) was defined by Posner and Rothbart (2000) as the ability to inhibit a response to a salient event in order to respond to a less salient event. Eisenberg et al. (2005) further explained that EC involves a variety of capacities that may contribute to regulation and successful adaptation of an individual. These include attention focusing, highlighting that the ability to maintain the attentional focus on a task can contribute to the processing of information and learning.

A recent study by Ladouceur et al. (2005) gives further emphasis on the argument that attentional control processes play an important role in emotion regulation and hence in the development of AD.In their study the authors employed an Emotional n-back task, which is a modified version of a working memory task named after n-back task (Casey et. al., 1995). In the n-back task, subjects are presented with a sequence of letters. The task consists of two conditions: the 0-back condition and the 2-back memory condition. In the 0-back condition subjects are asked to monitor the sequence of letters for any occurrence of a pre-specified letter. This condition does not involve any working memory load and it serves as a control condition. In the 2-back memory condition subjects are asked to observe the sequence of letters and respond whenever the current letter is identical as the letter presented two trials back. The Emotional n-back task follows the same procedure as the n-back task. What distinguish both tasks are the stimuli employed. Whereas in the n-back task only letters are employed with no background, in the Emotional n-back task four background pictorial conditions are superimposed onto the letters. These are: 1-No picture; 2-Neutral Picture; 3-Negative Picture; 4-Positive Picture. Examples of neutral pictures are: house, fork, car or dishes. Examples of negative pictures are: shark, angry face, pit bull or refugee. Examples of positive

pictures are: ice cream sundae, bunnies or smiling face. The aim of the Emotional n-back task is to measure cognitive interference caused by emotionally relevant pictures. Interestingly, Ladouceur and colleagues (2005) found a cognitive interference effect in children aged 8-16 years. They found that those children experiencing depression or comorbid depression/anxiety had significantly longer reaction times when performing the task in a negative compared to a neutral background condition. This finding suggests that children experiencing depression and/or anxiety have difficulties in exerting their attentional control skills, as they pay attention to emotional stimuli which are task irrelevant.

A model on temperament, anxiety and the processing of threat-related stimuli (Lonigan, Vasey, Phillips & Hazen, 2004) also highlights the role of EC as a cognitive skill acquired throughout development; crucial for the understanding of AD in childhood. Interestingly, it does so, taking into account the role that temperamental dispositions identified by Clark and Watson (1991) can have on the emergence of anxiety in childhood. Lonigan et al. (2004, see also Lonigan & Philips, 2001) posit an association between high levels of NA/N and the development of anxiety in childhood. This association is partially mediated by AB. See Figure 2.
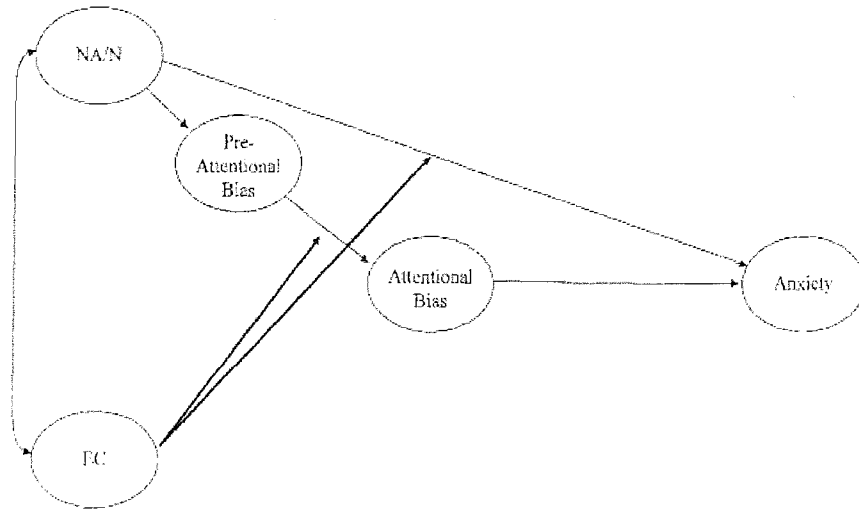
Figure 2. Model of hypothesised interactive effects of Negative Affect (NA) or Neuroticism (N) and Effortful Control (EC). (Lonigan et al. 2004)

In this model, high levels of NA/N could contribute to elevated levels of anxiety in an individual via two pathways. In the first one high levels of NA/N in part mediated by pre-attentional biases would increase the risk for anxiety. An individual high in NA/N would be prone to orient his/her attention to threat-related stimuli. This threat-related bias would operate in early automatic aspects of processing, in other words pre-attentively. However high levels of NA/N would not be sufficient for the development of an anxiety psychopathology. Low levels of EC would be an additional risk factor that would operate together with NA/N to produce vulnerability to AD. An individual with low EC would endure in a processing bias in favour of threat cues, even under conditions permitting effortful control of attention (selective attention). As a consequence an individual low in EC and high in NA/N would be prone to selectively attend to threat cues and exhibit a threat-related AB. EC would then act as a moderator in the relationship between a bias which favours threat stimuli in preattentive processes (pre-attentional bias) and a bias which favours threat cues in attentive processes (AB). Nevertheless as shown in Figure 2, this is only one possible pathway through which NA/N and EC interact to

produce elevated levels of anxiety. Other pathways related to EC (i.e. coping mechanisms) could also moderate the relationship between NA/N and anxiety. In contrast with Crick and Dodge's (1994) model, Lonigan's et al. (2004) model only focuses on one I-P stage, this is the encoding stage. However it constitutes a refinement of Crick and Dodge's (1994) model as it specifically addresses cognitive mechanisms within the encoding stage that could contribute to ABs such as EC. In addition, it adds to the understanding of childhood anxiety, focusing on cognitive processes specifically linked to an anxious symptomatology. In support of Lonigan's et al. (2004) model there is empirical evidence for the pathway in which EC would be a moderator in the NA/N − AB relationship (Derreberry & Reed, 2002; Eisenberg et. al. 2005). Future research should further investigate the development of EC throughout childhood in an attempt to understand how the interactive combination of NA/N and EC produce vulnerability to AD.

A recent study by Muris, de Jong and Engelen (2004) examined the contribution of NA and EC in relation to childhood anxiety. The evidence in the study corroborated that both NA and EC make an independent contribution to symptoms associated with AD. No support was found for the argument put forward by Lonigan et al. (2004) that an interactive combination of NA and EC is necessary for the development of AD. Muris et al. (2004) argued that this contradictory finding could be explained by the fact that relatively young children (8 years old) participated in the study. Attentional control skills of young children could still be limited. A fruitful line of research would be to examine at what point in development these attentional control skills are developed enough so the child can regulate his/her attentional allocation.

In summary, the models of Kindt and Van den Hout (2001) and Lonigan et al. (2004) suggest that the acquisition of attentional control skills can play a crucial role in the child's attentional allocation to threat. These

models are consistent with what several authors have proposed regarding the importance of considering children's levels of cognitive development when exploring anxiety in children (Weems, Berman, Silverman & Saavedra, 2001; Muris et al. 2002; Weems & Costa, 2005).In addition, the models fit well with the aforementioned theories on helplessness and anxiety; the lack of EC could lead to a sense of uncontrollability, contributing to a sense of helplessness in the individual (Beck 1976, Chorpita & Barlow, 1998, Mineka et al. 1998).

Other cognitive factors appear to be contributing to the development of anxiety, including intolerance of uncertainty and negative problem orientation (Laugesen et al. 2003; Armfield, 2006). Intolerance of uncertainty can be defined as the belief that unexpected events are negative and distressful. Negative problem orientation can be defined as the tendency to appraise problems as threats (Laugesen et al. 2003). A common feature of intolerance of uncertainty and negative problem orientation is the evaluation or interpretation of an event as threatening. Therefore the appraisal of a stimulus or situation as threatening appears to be another cognitive process playing a role in the development of anxiety. Mogg and Bradley (1998) already highlighted the role that the evaluation of a stimulus as threatening would play in the development or maintenance of anxiety. It should be mentioned that they did so in relation to attentional biases and not interpretive biases. They proposed a Cognitive Motivational Model (CMM), in which the vulnerability factor for anxiety is not the direction of ABs towards threat but the evaluation of a stimulus as threatening. The authors posit that ABs are not necessarily a sign of anxiety proneness because ABs are found in low trait anxious individuals when external stimuli have high threat value. They clarify however that ABs may be important in the maintenance of anxiety states. For example they argue that as a result of having a bias which favours threat stimuli, anxiety-prone individuals could be more likely to attend to threat stimuli in the environment reinforcing their perception of a dangerous world. In the CMM model the Valence Evaluation System (VES) is responsible for assessing a stimulus as threatening. Output from the VES feeds into a Goal Engagement System

(GES). The GES determines the allocation of processing resources to external stimuli. Whenever a stimulus is appraised as having a high threat value the GES automatically interrupts ongoing activities and allocates processing resources to the potentially threatening stimulus.

Interestingly Clark and Wells (1995) and Rapee and Heimberg (1997) developed a model of social phobia in which both the allocation of attentional resources and the evaluation of stimuli are taken into account. In Clark and Wells's (1995) model it is hypothesised that in social phobic individuals, attentional allocation away from external cues is biased in favour of detecting from others cues that can be interpreted negatively. The authors argue that the individuals are placing their attentional resources to their self image. In Rapee and Heimberg's (1997) model it is hypothesised that in social phobic individuals, both attentional allocation towards and away external stimuli is biased in favour of detecting potential social threats such as frowns or signs of boredom as negative. The authors argue that the individuals are placing their attentional resources to both their self image and potential external threats (i.e. frowns).In fact Rapee and Heimberg (1997) considered external cues as crucial in the individual's reinforcement of negative interpretations about social encounters. Although the models differ in the explanation of attentional processes linked to social phobia they both suggest that the evaluation of external stimuli as negative may contribute to social phobia.

In the next section, empirical work on I-P biases and childhood anxiety is reviewed to build up on existing theoretical work and to explore whether threat-related cognitive biases observed in adults can be also observed in children.

2.6 I-P Biases and Childhood Anxiety

2.6.1 Introduction

Is there any evidence of cognitive biases in anxious children that resembles the ones observed in adults with AD?

For the most part, research with children has revealed similar profiles of cognitive processing biases to those found in adults. Some of these biases have been found to occur in early stages of information processing (i.e. encoding stage) whereas others have been found to occur in later stages of information processing (i.e. interpretation stage). When reviewing this research, the terms of the I-P social model (Crick & Dodge, 1994) will be employed because this is the only model to date that addresses the child's processing of information from an integrative approach. In other words it takes into account diverse cognitive processes and not just one cognitive process in isolation. Hence this model provides us with tools for developing an integrative cognitive model on childhood anxiety. The search for cognitive precursors to anxiety can further refine an integrative model on childhood anxiety. Therefore the causal status of cognitive biases observed in anxious children will also be considered in a specific subsection. To try and obtain an even more complete understanding of the anxious phenomenon, different components of the anxiety construct (i.e. trait vs. state anxiety) and their contribution to cognitive biases will be taken into consideration. In addition to what extent the cognitive biases observed are specific to anxiety will be addressed.

2.6.2 The Encoding Stage: evidence for a Threat-Related Cognitive Bias

In line with adult research (Williams, et al. 1988, 1997; MacLeod & Mathews, 1988; Bradley, Mogg, Falla & Hamilton, 1998; Mogg & Bradley, 1999; Yiend & Mathews 2001) an association between anxiety and I-P attentional biases for threatening information has been observed in children

(Martin, Horder & Jones 1992; Vasey, Daleiden, Williams & Brown 1995; Vasey & MacLeod, 2001). This association has been observed with a variety of experimental paradigms. A recent meta-analytic study has shown that threat – related attentional biases (ABs) are observed in different types of anxious populations (i.e. high-anxious nonclinical individuals or anxious children and adults) and under a variety of experimental conditions (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg,& van Ijzendoorn, 2007)

An association between anxiety and I-P pre-attentive biases has also been found in adults (for a review see, Mathews & MacLeod, 1994). Few studies to date have investigated pre-attentive biases in children (Waters, Lipp, & Cobham, 2000; Boyer's et al, 2006). However the findings obtained so far fit with the adult literature (Mogg & Bradley, 1998).

Within this section research on pre-attentive biases and childhood anxiety will be first reviewed and then research on ABs and childhood anxiety will be considered. A review on the research on ABs and childhood anxiety will be organised based on the experimental paradigms used.

2.6.2.1. Pre-Attentive Biases in Childhood Anxiety

There is a need to explore whether ABs in children can also occur pre-attentively. A study by Waters, Lipp and Cobham (2000) attempted to investigate pre-attentive biases for threat in children. To do so, they used a startle eyeblink modification paradigm in which the amplitude and the duration of a startle reflex were measured. A series of trials in which a startle eliciting stimulus occurs (i.e. sudden loud noise) were presented in the absence of any other stimulus to form the baseline condition (for an illustration see graph A in Figure 3). These baseline trials were intermixed with trials in which the startle-eliciting stimulus was presented following a non-startling stimulus called a lead stimulus, which could be either a pair of threatening or neutral words. The interval between the startle-eliciting stimulus and the lead stimulus was of 60, 120, 240 or 3500 ms. It was called the lead interval (for an illustration see graph B and C in Figure 3).

Results showed that clinically anxious children exhibited startle eyeblink facilitation even at the 60 ms lead interval. There was a trend in the data indicating that these effects were more pronounced for threat words. The authors argued that the facilitation of an eyeblink reflex could reflect a protective mechanism that reduces the impact of the threatening lead stimulus. In addition the duration of the startle reflex was significantly shorter for threat words at 60ms lead intervals compared to neutral words, which is indicative of an attentional allocation to threat.

Based on the differential startle eyeblink effect observed during threat and neutral words at a 60 ms lead interval, Waters et al. (2000) argued that anxiety could influence the processing of threat words at a preattentive stage. Further corroboration of these results can be found in Boyer's et al. (2006) study. With a DPT the authors found pre-attentive biases towards pain-related and social-related words in a sample of 9-17 year olds with recurrent abdominal pain. These children had moderate symptoms of anxiety and depression. These results however were not replicated when looking at ABs as children showed an attentional avoidance of social and pain-related words. Further research might profitable examine whether the nature of biases towards potentially threatening stimuli is different at a subconscious (pre-attentional) or conscious (attentional) level.
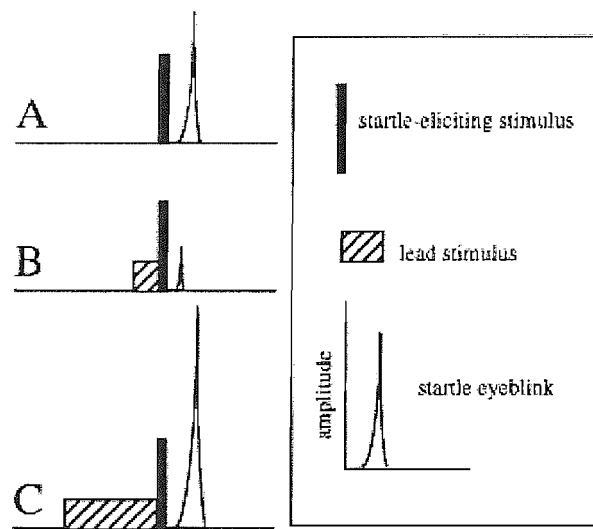
Figure 3. An illustration of a typical startle-eyeblink modification paradigm. Graph A depicts a baseline condition in which only a startle-eliciting stimulus is presented. Graph B depicts a short lead interval lead stimulation that results in startle inhibition. Graph C depicts a long lead interval lead stimulation that results in startle facilitation. (Source, Filion, Dawson & Schell, 1998)

2.6.2.2. Threat-related ABs with a DPT

Variants of a probe detection task developed by MacLeod, Mathews and Tata (1986) to measure attentional processing to emotional stimuli have given evidence of a threat-related AB in anxious children (Vasey & MacLeod, 2001). One variant of the probe detection task that has been extensively used to assess threat-related ABs in children involves the presentation of word pairs on a computer screen followed by a dot probe. On critical trials one of the paired words is threat-relevant whereas the other is emotionally neutral. On baseline trials both words are emotionally neutral. Every trial is followed by a dot probe that appears in a location just vacated by one of the paired words. The latency to detect the dot probe provides a measure of to what extent anxious children allocate their attentional resources to threat-related stimuli. The rationale underlying the DPT is that individuals experiencing anxiety are faster to respond to probe stimuli presented in the same location as previously presented threat-

related stimuli. They are faster because their attention is already focused on the region of visual display where the threat-related stimuli were presented.

Vasey et al.(1995) found that clinically anxious children (aged 9 to 14 years) were significantly faster to respond to a dot probe following threat words (i.e. accident, afraid, danger) compared to a dot probe following neutral words. The neutral words were matched with the threat words in length and level of difficulty. This significant result was more evident for older children and for children with increased reading ability. Taghavi, Neshat-Doost, Moradi, Yule & Dalgleish (1999) replicated this bias in a sample of clinically anxious children and adolescents (aged 9 to 18 years). Children were asked to respond to a dot that would appear after a neutral, threatening or depressive word. Social (i.e. rejected) and physical (i.e. explosion) threat words were used. An example of a depressive word used is "sad". The neutral words were matched for length and frequency with the critical words. It was found that clinically anxious children were faster to respond to a dot appearing after a threatening stimulus compared to a dot appearing after a neutral or depressive stimulus. Hence they showed an attentional allocation to threat. In contrast mixed anxious-depressed children did not show a selective attention towards threat or depressive related stimuli. Further research is needed to ascertain how biases associated with depression and/or anxiety may operate.

In a more recent study, Dalgleish et al.(2003) explored threat-related ABs in children and adolescents aged 7-18 years diagnosed with an anxiety disorder (GAD,PTSD) or depression disorder. The data indicated that GAD participants exhibited a threat-related AB with a DPT. It should be noted that this threat-related bias was not found in participants with PTSD or depression. Vasey, Elhag and Daleiden (1996), also corroborated an AB to threat-related word information in a non-referred group of children (aged 11 to 14 years) who reported high levels of test anxiety. The threat-related words used pertained to social threats (i.e. failure, lonely) and to physical threats (i.e. injury, disease).

2.6.2.3. Threat-Related ABs with a EST

The EST is a modification of the Stroop colour-naming task (Stroop, 1935). In the Stroop colour-naming task, words written in different ink colours are presented and subjects are asked to name the ink colour as quickly as possible ignoring the word content. In the EST neutral words and words with an emotional content are presented to the subject. Words with an emotional content would match an individual's concerns (i.e. threat-related concerns). Colour-naming latencies for words with an emotional content compared with words with a neutral content indicate the degree to which an individual favours the processing of emotional information (Kindt, Brosschot & Everaerd, 1997). The rationale underlying the EST is that the content of emotionally-relevant words (i.e. threat) would capture the attention of an individual (i.e. an anxious individual). As a consequence emotionally-relevant words would interfere with the individual's performance in colour-naming these words. Therefore, the colour-naming task in the EST provides a measure of cognitive interference caused by emotionally-relevant words.

Despite the fact that EST is the experimental paradigm most commonly employed in AB research (Kind et. al., 1997) it has lead to inconsistent results when investigating threat-related ABs in children. These inconsistencies are similar to those found in adult research (Van Honk, et al. 2001). Interestingly, some studies have found that age is a crucial factor when examining ABs with EST, especially when the threat-related stimuli are words. Moradi et al. (1999), for example, observed that children aged 9-17 years with PTSD took longer to colour name trauma relevant stimuli compared with non-emotional stimuli. Richards, Richards and McGeeney (2000) also observed increased colour-naming latencies to colour name emotional words in high trait anxious adolescents. However a threat-related AB does not appear to be consistently present in younger children when measuring colour naming latencies with a EST.

Early research found an AB in typically developing children as young as 4 years of age classified as being fearful of spiders. Martin et al.(1992) with a EST found an attentional bias in 6-7 year olds, 9-10 year olds and 12-13 year olds with spider-relevant words. The spider-fearful children were slower in colour-naming spider-relevant words relative to spider irrelevant. No reaction time (RT) differences were observed between the two types of stimulus words in non-fearful children. Moreover the magnitude of the attentional bias did not change significantly over the range of ages studied. Martin and Jones (1995) replicated the study with a sample of even younger children (4-5 years of age).

In contrast to the work of Martin et al. (1992) and Martin and Jones (1995) Kindt and colleagues have not found with a EST threat-related ABs in typically developing or clinical samples of children younger than 10 years (Kindt, Bierman & Brosschot, 1997; Kindt et al. 2003). Kindt et al. (1997) found that only spider fearful children in the older group (9 to 12 years) showed an AB towards threatening spider-related words. This result supports the hypothesis of a cognitive interference effect in the colour-naming task of the EST that depends on age. In line with this finding no concern-related ABs were found in children aged 8 and 9 years, even when confronted with a stressful inoculation situation (Kindt, Brosschot & Everaerd, 1997; Kindt, van den Hout, de Jong & Hoekzema, 2000). Recent studies however do not support an age-related interference effect. Morren, Kindt, van den Hout, and van Kasteren (2003) found no age-related interference effect in high fearful children aged 6-12 years when colour-naming spider words. Similarly Kindt et al. (2003) found little evidence for an interference effect dependent on age in 7-19 year olds children diagnosed of SAD, GAD and social phobia when colour-naming social or threat words. Further replication of Kindt and colleague's hypothesis is merited using different methodological paradigms, such as the DPT and using more ecologically valid stimuli such as faces or pictures.

2.6.2.4 Threat-Related ABs to Emotional faces and Pictures

Although an AB to threat-related words has been found, word-stimuli are not as ecologically valid for humans as faces (Ohman, Lundqvist and Esteves, 2001). It has been observed that young children are responsive to emotional faces from very early stages in life (Haviland & Lelwica, 1987). The authors demonstrated that 2 month-olds could differentiate among happy, sad and angry faces. In addition a more recent study by Turati and Simion (2002) has shown that newborns are able to discriminate among face-like schematic configurations. In contrast, the discrimination of diverse word stimuli is dependent on a child's cognitive ability to recognise or read the words (review by Ehrenreich & Gross 2002).

The argument that certain stimuli would not be as powerful for measuring ABs to threat in children could account for the failure to find an AB in some studies employing the DPT (Ehrenreich & Gross, 2002). In a recent study, Waters, et al. (2004) failed to find an AB to threat in clinically anxious children (aged 9-12 years) employing a pictorial version of the DPT (including pictures of snakes, spiders or sharks).They found that an AB towards fear-related pictures shown by clinically anxious children, was not significantly enhanced compared to the bias shown by non-selected children. Another study also failed to observe threat-related ABs in clinically anxious children using pictorial stimuli (Ladouceur et al. 2005). With an Emotional n-back task, the authors found an attentional bias towards negative pictures (i.e. shark, angry face, pit bull, refugee) only for the clinically depressed or depressed and anxious group of children. They did not find any effects for the clinically anxious group of children. A possible explanation of these somewhat striking results given by Ladouceur et al. (2005) and Waters et al. (2004) is based on the nature of the stimuli used. For example Ladouceur et al. (2005) argued that some of the negative pictures used may not have been sufficiently high in negative content and arousal for the anxious children. In addition Waters et al. (2004) made an interesting link between the nature of the stimuli and cognitive activation mechanisms. They argued that an activation of attentional processes

towards fearful pictures could not yet be consolidated in children as it may result from years of activation of cognitive mechanism triggered by fear. It has been shown that faces are emotionally relevant for humans even in earlier stages of life (Haviland et al. 1987). Therefore could ABs towards a threatening face be more readily triggered than ABs towards threat-relevant pictures as fear activation mechanism may have been present from early stages in development? Research looking at ABs to emotional faces in childhood anxiety can shed light upon this question.

To date, research employing visual search paradigms, in which the child is asked to search for emotional faces among neutral faces, has been successful in showing a threat-related AB in highly anxious children. Hadwin, Donnelly and Butler (2002), using a Visual Search Task (VST), found that 4 to 7 year old children with higher levels of perfectionism as reported by their parents detected the presence of an angry schematic face faster than their counterparts. Hewitt et al. (2002) gives support to the association between anxiety and perfectionism in children. He found that self-oriented perfectionism interacted with social stress to predict anxiety in children aged 10-15 years. Perfectionism has also been linked to anxiety disorders in adulthood (Antony, Purdon, Huta & Swinson, 1998). In a later study, Hadwin et al. (2003) further explored attentional search mechanisms in high trait anxious children with a sample of 7 to 10 year olds' using self-report measures. It was found that high trait anxious children were faster to make decisions about the absence of an angry face. These findings indicate that high trait anxious children terminated the search for angry faces quicker than for happy or neutral faces.

A link between the response to emotional faces and the risk of developing AD has also been found with methodologies other than the VST (Pine, Klein et al. 2005). The authors found that offspring at risk of PD reported more fear and showed longer latencies to report their fear when viewing an angry or fearful facial photograph, relative to offspring with low risk. They also had increased in social anxiety. Prolonged latencies were an index of greater attention allocation.

The literature reviewed above, shows that highly anxious children exhibit an AB towards threatening faces. This literature is consistent with the adult literature that has demonstrated vigilance for threatening faces both with a VST and a DPT (Gilboa-Schechtman, Foa & Amir, 1999; Mogg & Bradley,1998; Bradley, Mogg & Millar, 2000). However studies examining social phobia in adults have also demonstrated an AB away from threatening faces (Chen, Ehlers, Clark & Mansell, 2002). Only one study to date has shown that non-referred school aged children, with a social anxious symptomatology, can exhibit an AB away from negative faces-depicting anger, sadness, fear or disgust- (Stirling, Eley & Clark, 2006). However Pine, Klein et al. (2005) had previously found a link between increased social anxiety in offspring at risk of PD, and ABs towards angry/fearful faces. Moreover amygdala activation has been found to positively correlate with adolescents viewing fearful faces when looking at social dimensions of anxiety. One of the social dimensions explored was being separated from love ones (Killgore & Yurgelun-Todd 2005). Extensive data link amygdala activation with fear and anxiety (Larson et al. 2006) With a MDPT a strong association was found between social anxiety symptoms and avoidance of angry and fearful facial photographs. Interestingly a previous study had shown that clinically anxious children could show an AB away from faces (Pine, Mogg et al. 2005). The researchers found an AB away from angry/threatening facial photographs in children with a diagnosis of posttraumatic stress disorder using a MDPT. Further research should be carried out to look at whether attentional biases towards or away threatening faces may differentiate high levels of trait anxiety from psychopathology. In addition there is a need to examine the developmental course of ABs to emotional faces in socially anxious children.

2.6.3 The Interpretation Stage: evidence for a Cognitive Bias

An interpretation bias to threat in high and clinically anxious children has been observed throughout a variety of methodologies and stimuli.

Hadwin, Frost, French and Richards (1997) examined the relationship between the interpretations of ambiguous stimuli in 7-9 year olds employing a pictorial homophone task .Children heard a string of words some of which were homophones. The homophones were words that sounded the same but had two meanings. One meaning corresponded to a threatening interpretation of the word (i.e. die) whereas the other meaning corresponded to a neutral interpretation of the word (i.e. dye). Children were shown pictures of two objects, one of them with a threatening meaning and the other one with a neutral meaning. Children were then asked to point to the picture that went with the word they had heard. Interestingly it was found that self-reported trait anxiety was positively correlated with the number of threatening interpretations made for the homophone words. A threat –related interpretative bias has also been observed in a study with homographs, which are words that are spelled the same but that have a different meaning depending on the way they are pronounced (Taghavi et al. 2000). It was found that clinically anxious children and adolescents chose the threatening meaning of ambiguous homograph words,such as tank or hit, more often than healthy control participants. These findings are consistent with adult research, which has shown that high trait and clinically anxious individuals are prone to interpret a series of threat-neutral homophones and homographs as threatening (Eysenck, MacLeod & Mathews, 1987; Mathews, Richards & Eysenck, 1989; Richards & French, 1992).

Studies employing story tasks, in which a hypothetical situation is presented to the children, give further evidence for an interpretative bias in children suffering from anxiety. In these tasks, children are presented with ambiguous and non-threatening situations. Depending on the variation of the task, they can be asked to 1) decide as quickly as possible whether a story is scary or not; 2) tell how each story would end; 3) say how they would feel and/or what they would think when confronted with that situation.

It has been found that negative expectations regarding a story situation in children as young as 5 years of age can predict anxiety one year later (Warren, Emde & Sroufe, 2000). The authors used children's play narratives to characterize children's internal representations regarding others and themselves and regarding expectations when confronted with a story situation. Children aged 3-8 years were asked to finish a set of stories told in play enactments with dolls and toys. It was found that child negative expectations towards a story situation measured at 5 years of age, predicted symptoms at 6 years of age for internalising and anxiety symptoms on mother/father/teacher reports. In addition child negative expectations at 5 years of age significantly predicted mother reports of separation anxiety, overanxious and social phobia/avoidant disorder at 6 years of age. The child's negative expectations reflected distressful interpretations of the story situations. Along the lines of Warren et al. (2000) study, children with high levels of trait anxiety (Muris, Luermans et al. 2000; Bögels, van Dongen et al. 2003; Muris, Meesters, Smulders & Mayer, 2005) clinically anxious children (Barret, Rapee, Dadds & Ryan, 1996; Creswell, Schniering & Rapee, 2005) and non-referred socially anxious children (Muris, Merckelbach et al. 2000) have been found to interpret ambiguous situations as more threatening compared to low anxious children. Non-referred socially anxious children have been also found to have distorted beliefs regarding their social skills (Cartwright-Hatton, et al. 2005). Specifically they believe that they lack social skills. This belief could reinforce the child's threatening interpretation of ambiguous social situations. In addition Muris, Luermans et al. (2000) and Muris, Merckelbach et al. (2000) observed that not only the interpretation of an ambiguous situation as threatening is playing a role in childhood anxiety. They demonstrated that a readiness to perceive a situation as threatening is also playing a role.

Muris, Luermans et al. (2000) using both ambiguous and non-threatening stories, found that high levels of anxiety in the children were associated with an early detection of threat even in non-threatening scenarios. In a further study Muris, Merckelbach et al. (2000) found that

non-referred socially anxious children needed to hear fewer sentences before deciding that an ambiguous story was scary compared to non-socially anxious children.

This cognitive distortion had been identified by Daleiden and Vasey (1997) and named "intensity of attention". It has recently been termed as "reduced evidence for danger" RED (Muris & van Doorn, 2003). It refers to the low threat-related threshold that anxious children have when interpreting ambiguous threatening situations or even non- threatening diverse situations.

Interestingly both threat-related interpretive biases and RED have been found to be significantly correlated with not only a stable predisposition towards anxiety (trait anxiety) but with a transitory anxious response (state anxiety). Muris, Rapee, Meesters, Schouten and Geers, (2003) examined the relative contribution of state and trait anxiety in non-referred children aged 8-13 years using an ambiguous story task. They found that high levels of trait anxiety were significantly correlated with increased threat perception and lower threat thresholds. High levels of state anxiety were also found to be associated with increased threat perception and lower threat thresholds. However these threat perception biases were not the result of an interaction effect between trait and state anxiety. In contrast a state and trait interaction effect has been observed with adults. High-trait subjects showed an AB towards examination-related words only in a situation in which their state anxiety levels were enhanced; this is in proximity of examination (MacLeod & Mathews 1988). This finding is consistent with Williams et al. (1988, 1997) adult cognitive model of threat processing in which it is argued that ABs for threatening stimuli are an interactive function of state and trait anxiety. Future research is needed to disentangle the relationship between the different anxiety components (i.e. state vs. trait anxiety) and cognitive biases.

A recent study by Weems, Zakem, Costa, Cannon and Watts (2005) gives further support for the association between anxiety in children and an

interpretation bias for story situations, taking into account physiological components of anxiety. The authors found that heart rate interacted with negative interpretations of a hypothetical vignette in predicting childhood AD. In other words, negative interpretations of a hypothetical vignette appeared to be augmenting the negative feelings that heightened physiological responding can bring. Interestingly, the association between anxiety in children and interpretation biases for hypothetical situations have been replicated with an ethnically diverse community sample of children even when controlling for the effects of life stressors on worry (Suarez-Morales & Bell, 2006).

In another approach to the question of interpretive biases, Dineen and Hadwin (2004) compared other with self-judgements regarding a story situation in children aged 6-8 years. They found that anxious children were more likely to judge that others would interpret a situation as negative whereas they would interpret it positively. An opposite pattern of results was found for children with depressive symptoms. Self-report depressive symptoms were linked to an increase in the number of negative interpretations made for self-judgements. These findings are indicative of interpretive biases specific to anxiety and depression. Along the lines of these findings Dalgleish et al. (1997) found that when estimating future negative events, children's judgements of other-referents were related to anxiety symptoms. However no differences between other and self-referent judgements were found related to depression. Other conflicting results have been found in a recent study by Muris and van der Heiden (2005). The authors showed that both depression and anxiety symptoms increased the likelihood of an anxious interpretation made about judgements that related to oneself. Further research is merited to ascertain whether there is an interpretive bias specificity to anxiety in relation to self and other judgements.

A feasible explanation of why interpretative biases would occur in childhood anxiety could be found in Kendall' s theory of schemas (1983) and is consistent with Beck's cognitive theory of emotional disorders

(1976). Kendall argued that anxious children have chronic over activity around themes of danger which activates their cognitive schemes of threat. The continuous over activation of these schemes would make the child more likely to appraise an ambiguous or even non –threatening situation as dangerous and could lead him/her to decide quicker that a situation is threatening. This explanation is supported by some research that has shown that high anxious children and adolescents reported to have more anxious or threatening thoughts than low-anxious children (Zatz & Chassin, 1985).

To conclude, the empirical work reviewed on cognitive biases and anxiety has provided evidence for threat-related pre-attention and attention biases in high trait anxious, socially anxious and clinically anxious children. Evidence for threat-related interpretive biases in high trait and clinically anxious children has also been found. In addition young children's distressful expectations about a story situation have been linked to the development of a separation anxiety, overanxious and social phobia/avoidant disorder. The evidence for threat-related attention and interpretive biases is consistent with adult research. However is there any empirical work that explores whether these cognitive biases could be precursors to childhood anxiety? This question is addressed in the following section.

2.6.4 Cognitive Precursors to Anxiety

Studies in which the processing biases are manipulated to determine whether anxiety levels are also modified could serve to explore the causality of attentional and interpretative biases in the development of childhood anxiety.

The most powerful experimental design to infer causality from processing biases comes from manipulation studies in adults, in which attentional and interpretative biases are manipulated and anxiety vulnerability is assessed after the manipulation (Mathews & Macleod, 2002;

MacLeod, Campbell, Rutherford & Wilson, 2004). Manipulation studies have developed attentional and interpretative training programmes which have successfully modified individuals' anxiety vulnerability (MacLeod et al. 2002; Yiend & Mackintosh 2004). These studies invite the conclusion that attentional and interpretative biases make a causal contribution to the levels of anxiety in the individual. However, there is a need to extend the manipulation paradigm to children's studies in order to shed light on the causality of I-P biases in childhood anxiety. An understanding on what attentional and interpretive training procedures consist of can enable researchers to do so.

Attentional training procedures consist of inducing ABs to threatening cues or avoidance of such threatening cues. An attentional training procedure has been successfully implemented following a DPT paradigm using both words and faces. Two words or faces, one with a threatening value and the other with a neutral value are displayed on the screen followed by a dot probe to be identified. In the condition intended to induce attention to threatening cues the dot probe appears in the vicinity of threatening stimuli. In the condition intended to induce avoidance to threatening cues the dot probe appears in the vicinity of the neutral stimuli (Mathews & MacLeod, 2002). Interpretative training procedures follow the same rationale as the attentional training procedures. When it is aimed to induce an interpretive bias to threat, a training contingency is built in which threatening interpretations consistently facilitate the performance of the task. When it is aimed to induce an interpretive avoidance of threat, the training contingency built consistently associates none threatening interpretations with the facilitation of task performance (MacLeod et. al., 2004).

Apart from manipulation studies, prospective studies can also shed light on the causality of I-P biases in childhood anxiety. To date only one prospective study supports the proposition that cognitive biases could act as a causal factor for the development of anxiety in childhood (Warren et al. 2000). As mentioned earlier the authors presented children with some story

situations and asked them to finish them in play enactments. Interestingly it was found that child negative expectations towards a story situation measured at 5 years of age predicted symptoms at 6 years of age for anxiety symptoms. The fact that child negative expectations were predictive of later anxiety is suggestive of a causal developmental pathway in which cognitive biases would lead to anxiety. Another prospective study carried out by Muris et al. (2005) did not find support for the notion of causality between I-P biases and childhood anxiety. It should be noted however that this study only tracked children over 6 months. Non-referred children aged 8-12 years were presented with ambiguous story situations. In contrast with Warren et al.'s (2000) findings it was observed that children's threat perception scores were not predictive for the persistence of anxiety symptoms during a period of 8 weeks. More prospective studies carried out over a longer period of time are needed in order to clarify whether cognitive biases are a cause of childhood anxiety or they are an epiphenomenon of an anxious symptomatology.

2.6.5 The Response Access and Decision Stage: Further evidence for Cognitive Biases

There are few available empirical studies exploring these latter I-P processing stages. Regarding the response access stage, it has been found that children and adolescents with PTSD (Moradi et al. 2000) and high trait anxious children (Daleiden 1998) exhibit a memory bias in explicit memory tasks but not in implicit ones. In explicit memory tasks an effortful retrieval of previously learned information is required (Coles & Heimberg, 2002) whereas in implicit memory tasks there are not any specific instructions for participants to search their memory. An example of an implicit memory task is completion of word stems (i.e. pr___) with the first word that comes to mind (Coles & Heimberg, 2002).Contrary to these studies, a link between memory biases and trait anxiety in adults has been found with implicit memory tasks (Mathews, Mogg, May & Eysenck, 1989). However, this finding warrants further corroboration as Harrison and Turpin (2003) could not replicate it. A link has also been found between memory

biases and implicit memory tasks in depression (Watkins, Martin & Stern, 2000). Using explicit memory tasks with adults, a memory bias has not been replicated across anxiety disorders (Hadwin, Garner & Perez-Olivas, 2006). However it is been replicated in depressive disorders (Tarsia, Power & Sanavio, 2003). Due to inconsistencies in the findings, further research is merited to clarify the nature of mnemonic processes and its specificity to AD in children and adults.

Regarding the response decision stage, Field and Lawson (2003) found that fear information increases behavioural avoidance as well as fear beliefs in 6-9 year olds. Children were presented with pictures of three Australian marsupials. Children were randomly allocated to a counterbalancing order in which positive, negative or neutral information was given about each animal. The authors found that negative information given about an animal increased the fear belief regarding the animal. In addition a reluctance to approach the box containing animals associated with negative information and a willingness to approach the box of animals associated with positive information was observed. Thus this study is pioneering in that it demonstrates that changes in fear beliefs can translate into behavioural responses. Recent research has also demonstrated that threat-related information does not only change children's beliefs and behavioural responses but it also changes physiological responses (Field & Schorah, 2007). The researchers found that children aged 6 to 9 who were given threatening, positive or no information about three novel animals showed elevated heart rates when approaching a box that contained an animal linked to threatening information.

Interestingly temperamental factors such as behavioural inhibition could moderate the effect of fear information facilitating the ABs to stimuli associated with threatening information and facilitating behavioural avoidance of stimuli linked to threatening information (Field, 2006c).

In the next paragraphs, family factors including parental verbal information given to the offspring, are explored in their relationship with childhood anxiety.

2.7 Family Factors and Childhood Anxiety: Introduction

In the following sections the emergent literature on family factors and childhood anxiety is pulled together in an attempt to understand the development and/or maintenance of anxiety. Etiological models are presented depicting the factors and pathways that could partially contribute to a child's anxiety. In doing so the argument that anxiety could co-segregate within families is made. In other words the emergence of anxiety in the child could be due to a genetic predisposition in the child and could also be due to environmental factors within the family such as parental behaviours. The relevance of a family environment pathway which stresses the importance of developmental issues in the pathogenesis of childhood anxiety is outlined. In addition mechanisms via which family variables could contribute to a child's anxiety are presented.

2.8 Contemporary Models of Parenting and Childhood Anxiety

Increased research has provided researchers with new conceptual frameworks for the study of anxiety in childhood. These conceptual frameworks highlight the role that the reciprocal relation between parent and child has in the development of childhood AD or fears (Rapee 2001; Muris & Merckelbach 2001; Ginsburg & Schlossberg 2002).

Rapee's (2001) model of the development of Generalized Anxiety Disorders (See Figure 4) for example gives a comprehensive view on the reciprocal relation between parent and child. The model is specifically illustrated using the example of generalised anxiety; however Rapee argued that it could be applied to any form of childhood anxiety. According to the model there are some genetic features that could enhance children's vulnerability to anxiety. For example, an anxious parent could give birth to a child with an anxious genetic predisposition characterised by high levels of arousal and emotionality or characterised by high levels of neuroticism. Neuroticism has been defined as the proneness of the individual to experience negative affect (Lonigan & Philips, 2001; Mangold & Wand, 2006).

The model also identifies parental factors that could impinge on the child's anxiety. Specifically two parental factors are mentioned: 1-parental anxiety; 2-parental reaction. Rapee argued that an anxious parent is more likely to respond with excessive control and overprotection to a vulnerable child (see also Hudson & Rapee, 2004). In line with this argument Ginsburg, Siqueland, Masia-Warner and Hedtke (2004) heightened the effects of parental anxiety on specific parental behaviours such as allowing avoidance or taking over for the child, which could promote the child's anxious interpretations of events. Interestingly both Rapee (2001) and Ginsburg et al. (2004) stated that although parental anxiety could lead to parenting behaviours promoters of a child's anxiety, child characteristics such as shyness could also contribute to the development and/or

maintenance of these parenting behaviours. To illustrate this latter argument, Rapee (2001) explains that a parental behaviour could appear as a result of many years of dealing with a vulnerable child; this is as a parental reaction and not due to a basic parenting style in anxious parents. It is possible for example, that after years of taking care of a sensitive child, parents have fallen into a maladaptative pattern anticipating distress in the child, leaping into his/her assistance in order to avoid an expected distress. Thus, although this maladaptive pattern would be more likely to appear in anxious parents, non anxious parents could show a similar approach to parenting. Indeed it is been shown that non-anxious parents can exhibit maladaptive behavioural patterns, such as low warmth and control, towards their anxious children (Woodruff-Borden, Morrow, Bourland & Cambron, 2002; Moore, Whaley & Sigman, 2004).Whether it is the anxiety in the parents shaping a maladaptive behaviour towards the child or it is the child's anxiety shaping the parent's behaviour is not clarified in Rapee's model. Further research is warranted to untangle the effects of parental anxiety on parental behaviour on one hand and the effects of child characteristics on parental behaviour on the other (review by Connell & Goodman, 2002).

Rapee's model however identifies a possible pathway via which parents might enhance a child's anxiety. In his model it is proposed that parental overprotection could augment the child's vulnerability to anxiety by increasing their tendency to perceive threat. No direct link between parental overprotection and a child's anxiety is outlined. Thus, a partially cognitive mediated pathway in which parental overprotection would contribute to a child's threat-related bias and this bias would in turn augment the child's levels of anxiety is depicted in the model (see Figure 4, pathway in bold). A cognitive mediated pathway of transmission of anxiety was first outlined by Rachman (1991). In his theory of fear acquisition he argued that the child could learn to perceive the world as dangerous after receiving negative information from the parents. This pathway in which the provision of negative information appears to play a role in the acquisition of fear has been further supported by empirical work (Field, Argyris & Knowles, 2001;

Field & Lawson, 2003; Field 2006b). Related literature also suggests other pathways in which cognitive biases might stem from the relationship between parental negative reactions and childhood anxiety (Gerull & Rapee, 2002; Morren, Kindt & Muris, 2004). For example Morren et al. (2004) showed that anxious responses from parents contributed to the offspring's dangerous appraisal of a situation. Therefore modelling or observational learning is another feasible pathway in the acquisition of worries. It was also outlined by Rachman (1991) in his theory of fear acquisition when he stated that the child could estimate that a situation is dangerous after the observation of certain parenting behaviours.

Two circumstantial factors intimately linked to parental factors are also suggested as likely to have an effect on a child's vulnerability to anxiety. The first circumstantial factor is non-specific stressors such as birth order. The findings regarding the role of birth order on anxiety are mixed. On one hand extra attention and guidance from the parents towards the first born child has been found to help him/her develop a positive self-image acting as a protective factor against social anxiety (Bögels, Van Oosten, Muris & Smulders, 2001). In contrast, first born children have been found to report more social anxiety than last born children when the parents were divorced (Erickson, 2005). In addition there are studies that report no effect of birth order on anxiety (Touliatos & Lindholm, 1980).The second circumstantial factor is specific threat events experienced. Rapee argues that specific life stressors experienced along the developmental path will have an impact on a child's vulnerability to anxiety (Rapee 2001). This argument is in line with Rachman's (1991) theory of acquisition of fear in which it is argued that aversive stimuli can lead to a fearful response. In support of Rapee's (2001) and Rachman's (1991) propositions it is been observed that poverty, marital distress and marital break up experienced in childhood increases the risk of anxiety symptoms in adolescence (Spence, Najman, Bor, O'Callaghan & Williams, 2002). However it should be noted that the negative impact of these life stressors may be dependent on factors such as social support or coping strategies that amplify or buffer their effect (Manassis, Hudson, Webb & Albano, 2004).
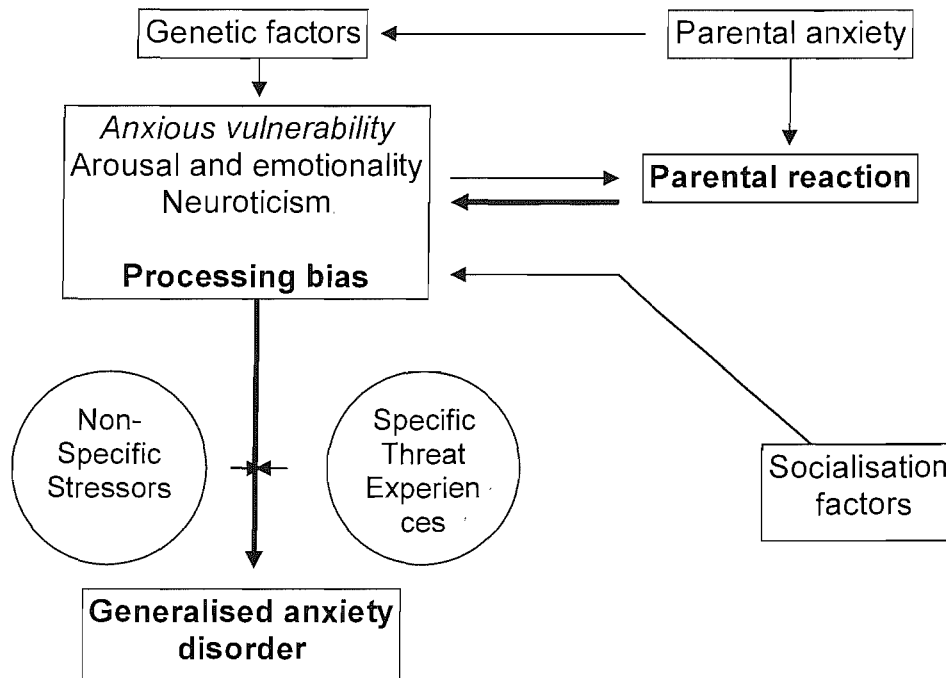
Figure 4. A model of the development of anxiety (Rapee, 2001)

A second model that has heuristic value in highlighting the implications of parental factors in the development of anxiety, is the one depicted by Ginsburg and Schlossberg (2002) (See Figure 5). This model also takes into account the child's genetic predispositions to AD, such as high levels of arousal. These genetic predispositions would constitute a child anxious vulnerability. Consistent with Rapee's model (2001) it is suggested that high levels of parental anxiety could lead to anxiety-enhancing parenting behaviours (i.e. over control, criticism). To what extent parental anxiety would contribute to anxious parenting behaviours or the offspring anxiety would contribute to them is not clarified. Consistent with Rapee's model (2001) modelling and the provision of negative information are mechanisms depicted as contributing to anxiety in the child. For example the model proposes that modelling of maladaptive parenting behaviours could be a moderator or mediator between that parent and the child's anxiety. It also proposes that parental negative communication, such as criticism, could also moderate or mediate the relationship between the parent and the child's anxiety. One last similarity between Rapee's (2001) and Ginsburg and Schlossberg's (2002) models is the proposal that the child's cognitive

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distortions may mediate the parent-child's anxiety linkage. Finally it is noteworthy that the child's cognitive maturation is taken into account. As mentioned earlier the child's cognitive maturation should be considered when investigating threat-related cognitive biases.

A third model that deserves our attention is Muris and Merckelbach (2001) multifactorial model of the aetiology of childhood specific phobias (See Figure 6). This model further highlights the importance of parents as influencing the child's social-emotional learning. Hence the authors propose that parental rearing behaviours, stressful life events and specific learning experiences would interact with genetically based behavioural patterns (such as disgust sensitivity) evoking extreme persistent fears that would surpass normal developmental fears leading to a form of specific phobia. The authors enumerate two pathways underlying specific learning experiences mentioned in the previous models: modelling and the provision of negative information. The authors also mention an additional pathway: direct conditioning. This direct conditioning pathway was first proposed by Rachman (1991) in his theory of fear acquisition. Nevertheless, in contrast with the above mentioned models, cognitive distortions are not conceived as potential mediators in the relation between parental factors and the child's fears. They are exclusively conceived as an epiphenomenon of childhood phobia. Hence once a specific phobia exists, cognitive distortions would act as maintainers of such phobia.
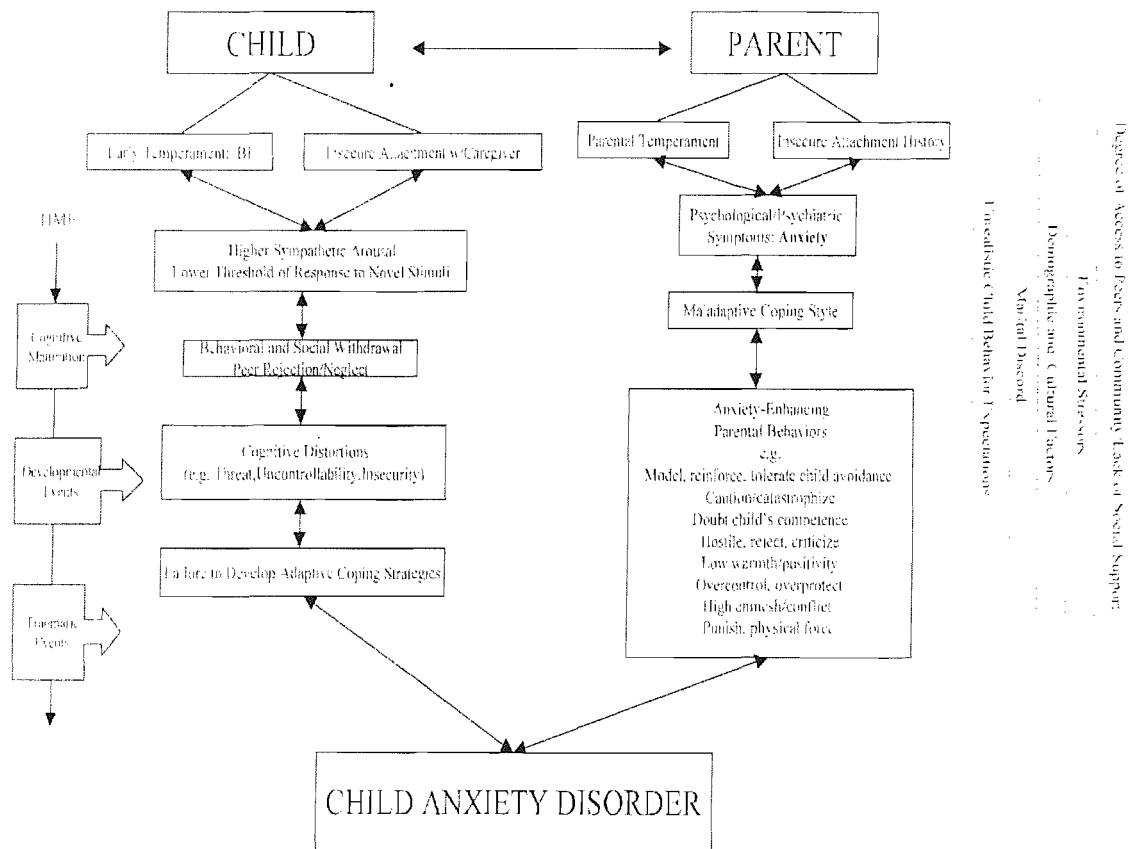
Figure 5. Developmental model of childhood anxiety (Ginsburg & Schlossberg, 2002)
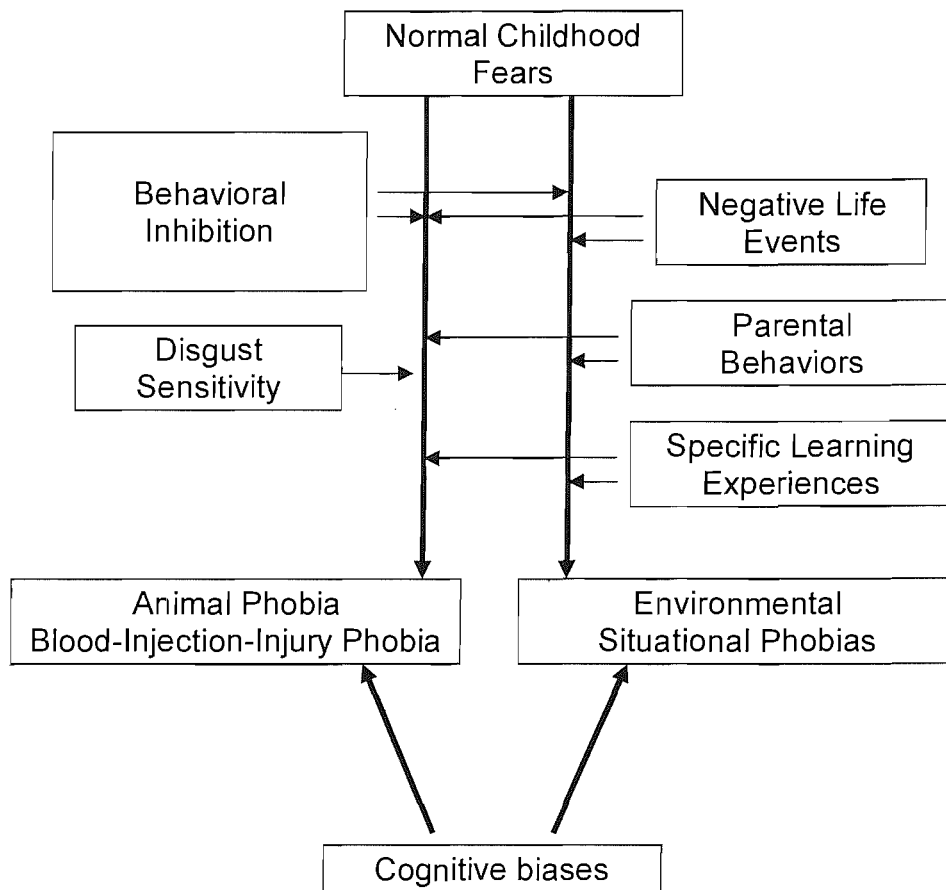
Figure 6. A multifactorial model of the aetiology of childhood specific phobias (Muris & Merckelbach, 2001)

Developmental models add to the understanding of the parent-childhood anxiety relationship but little is known about the precise dynamics of this relationship. Therefore, longitudinal studies, experimental designs or intervention designs are needed to establish the direction of effects in the parent-child relationship (reviews by Wood et al. 2003; Connell & Goodman, 2002). So far a handful of longitudinal studies give tentative evidence for the suggestion that parental factors could play a causal role in the development/maintenance of AD (Poulton et al. 2001; Gadeyne, Ghesquiere & Onghena, 2004; Chambers, Power & Durham, 2004; Dallaire & Weinraub, 2005). In addition the concept of equifinality is crucial when exploring pathways of influence in the parent-childhood anxiety linkage. (Wood, McLeod, Sigman, Hwang & Chu, 2003). Indeed this concept has been referred to in various developmental psychopathology approaches (Davies & Cicchetti, 2004; Muris, 2006). The concept of equifinality is operationalised by Wood et al. (2003) when they suggest that: (1) there are multiple pathways to the same anxiety disorder, (2) a single factor such as parenting cannot account for the development of any given disorder. In other words environmental factors cannot explain the totality of the phenomenon. The concept of multifinality was also defined by Wood et al. (2003). This concept acknowledges that a single risk factor can have a variety of outcomes (i.e. anxiety, other psychological problems) depending upon the context in which it operates. The complexity of understanding pathways in the development of AD is made evident with both concepts.

2.9 Pathways involved in the development of AD

Two main pathways have been identified in the acquisition of AD. An environmental and genetic pathway (King, Eleonora & Ollendick, 1998; Poulton & Menzies, 2002). Both pathways have been outlined in etiological models of childhood anxieties. A genetic pathway advocates that innate fears are heritable (Poulton & Menzies, 2002). An environmental pathway advocates that fears are acquired via learning processes that take place in the environment (Rachman, 1991; Field, 2006a). It is well accepted that

susceptibility to anxiety can be determined by the combined influence of genetic and environmental pathways on early development (review by Gross & Hen, 2004; Muris 2006).

Poulton et al. (2001) attempted to explore different pathways on the aetiology of separation anxiety. In a longitudinal study, he observed a link between self-reported separation anxiety at age 11 and the mother's fear of going out alone when the cohort was aged 9 years, accounting for 1.8% of the variance in symptoms. The finding that exposure to the mother's fearful behaviour influenced separation anxiety symptoms at age 11 years, clearly supports a family environment pathway. Further evidence for this pathway regarding separation anxiety in children (SAD) is given by Eley (2003). Evidence for this pathway is also given in relation to fear of failure, which is linked to social fear (Stevenson, Batten & Cherner 1992). However, it should be noted that the small amount of variance explained in Poulton et al. (2001) study is indicative of a genetic pathway in which a biological predisposition towards AD may take part in the development of anxiety symptoms. Indeed, Kagan and Snidman (1999) identified a biological risk factor linked to anxiety symptoms: behavioural inhibition (BI). BI was defined as the tendency of children and adolescents to respond with signs of fear and withdrawal and to be usually shy in a novel situation. This tendency could lead to the behavioural avoidance of the situation (Scarpa & Raine, 2002). BI indicates low thresholds of limbic arousal or increased sympathetic activity in response to challenge (Rosenbaum et al. 2000). However BI is not purely genetically determined. It is been found that parental co-occurrence of major depression and PD can augment the child's vulnerability to experience BI (Rosenbaum et al. 2000). Still little is know about the specificity of the outlined association between BI and anxiety, as an association between BI and depression has also been found (Mufson, Nomura & Warner, 2002; Muris, Meesters & Spinder 2003). In order to shed light on this research question it has yet to be ascertained whether the expression of anxiety and depression can reflect a common underlying genetic or environmental risk factor across development (Silberg, Rutter & Eaves, 2001). Interestingly common environmental risk

factors appear to be playing a role in the emergence of symptoms of depression and SAD across development (Silberg et al. 2001). It should be clarified at this point that the influence of environmental factors on the emergence of SAD appears to vary across development. In fact, genetic influences on SAD have been found to increase with age, whereas environmental influences have been found to decrease with age (Feigon, Waldman, Levy & Hay, 2001; Leech, Larkby, Day & Day, 2006).

To conclude, the reviewed literature demonstrates that the origin of anxiety is not all in experience, as genetic factors also come into play. But several researchers remind of the need of environmental accounts of fear acquisition (Muris, Merckelbach, de Jong & Ollendick, 2002; Poulton & Menzies 2002). This stems from the fact that genetic accounts do not take into consideration factors found to be crucial in the explanation of childhood anxiety, such as the developmental level of the child and his/her early experience with uncontrollable events. Within the environmental account our attention is drawn to the role of the family on childhood anxiety, as the family is the child's main environment in which emotional and social skills are acquired (Rubin, Cheah & Fox, 2001; Reiss, 2001).

2.10 The Role of Family Factors in Childhood anxiety

Guided by theory (Rapee, 2001; Muris & Merckelbach, 2001; Ginsburg & Scholessberg, 2002) and by reviews of family factors and childhood anxiety (Wood et al.2003; Bögels & Brechman-Toussaint 2006) the effects of parental psychopathology and parenting variables on childhood anxiety will be examined.

2.10.1 Parental Mental Health and Childhood Anxiety

The link between parental psychopathology and childhood anxiety has been extensively documented. Parental social anxiety has been associated with social anxiety disorders in the offspring (Merikangas, Lieb, Wittchen & Avenevoli, 2003). A vast amount of research also suggests that

SAD and PD may aggregate in families (Manicavasagar et al. 2001; Schneider, Unnewehr, Florin & Margraf, 2002; Schneider & Nundel 2002; Biederman et al. 2006). Interestingly an association between SAD in the offspring and parental PD has been highlighted (Pine 1999). High levels of parental PD and agoraphobia have been found to increase the risk for AD such as SAD in offspring aged 6-17 years (Biederman et al. 2004). In addition an association between parental PD and depression and the risk for SAD in the offspring aged 2-25 years has been found (Biederman et al. 2001). This association needs further investigation as it was not replicated in a later study by Biederman et al. (2004).The importance of further investigating the association between parental PD and depression with SAD in the offspring is heightened in a study by Kearney, Sims, Pursell and Tillotson (2003). They suggested that the possibility as to why some children continue to display separation anxiety symptoms could surround parental psychopathology. They found that parents of children with clinical SAD experienced greater depression, obsessive compulsive behaviour, phobic anxiety and general distress.

Despite the outlined impact of parental mental health on a child's anxiety, it should be mentioned that parents experiencing an anxious or depressive symptomatology are more likely to report that their offspring have emotional difficulties (Chilcoat & Breslau, 1997; MacLeod et al. 2007). This methodological caveat is overcome in Biederman et al. (2001); (2004) studies as children's assessments were made by raters blind to the probands diagnosis. It is also overcome in Kearney's et al. (2003) study as children's assessments were made by various informants (parents, teachers, clinicians and the children).

Research focusing specifically on maternal mental health, has found an association between mother's general levels of anxiety and anxiety in the child in clinical and community samples (Biederman et al. 2001; Costa & Weems, 2005; Shamir-Essakow,Ungerer & Rapee, 2005). Further studies (carried out within community samples) have found that a specific anxious symptomatology in the mother can be related to a specific anxious

symptomatology in the child. For example, it has been observed an association between social anxiety in the mother and social anxiety in the child (Bögels, et al. 2001). An association between separation anxiety in the mother and separation anxiety in the child has also been found (Peleg, Halaby & Whaby, 2006).

Existing research has also made evident the relationship between the mother's depression and the emergence of an anxious-depressive symptomatology in the adolescent (Spence et al. 2002). Interestingly maternal depression has been found to be strongly associated with dysfunctional parenting (Herwig, Wirtz & Bengel, 2004). For example, maternal depression has been related to less warmth and more psychological control in parenting (Cummings, Keller & Davies, 2005). Maternal anxiety could also lead to dysfunctional parenting behaviours (Weinberg & Tronick, 1998; Woodruff-Borden, Morrow, Bourland & Cambron, 2002). To fully understand the relationship between maternal psychopathology and maternal behaviours further research is needed. Researchers should try and ascertain the proportion of maternal behaviours variance explained by maternal psychopathology and the proportion of maternal behaviours variance explained by the child's psychopathology . Researchers should also focus on the role of paternal factors when looking at the maternal factors- childhood psychopathology relationship (reviews by Connell & Goodman, 2002; Bögels & Brechman-Toussaint, 2006). Indeed the impact of maternal factors on a child's anxiety could be counteracted by paternal factors. Support for this argument comes from a study which found that a close relationship with fathers acted as a protective factor that reduced symptoms of maladjustment in adolescents (Grych, Raynor & Fosco, 2004).

In the following section a review of the literature on parenting and its effect on the child's anxiety will be presented to shed light on dysfunctional parenting practices and their relationship with anxiety in childhood.

2.10.2 Parenting and Childhood Anxiety

2.10.2.0 Introduction

Bowlby's (1973) attachment theory is at the core of the literature on parenting and the child's emotional adjustment. He defined attachment as an early establishment of an intimate relationship between the child and the caregiver. Rejecting behaviours from the caregiver would have a detrimental effect on the parent-child bonding leading to a child's insecure attachment style. A child's insecure attachment style could evoke anxiety in him/her when separated from the caregiver (Ainsworth & Bowlby, 1991). In line with this argument, a recent prospective longitudinal study that analysed parenting behaviours during mother-child interaction tasks shows how mother-child attachment security predicts children's SAD at age 6 years (Dallaire & Weinraub, 2005). A child with an insecure attachment style would be unsure of the availability and accessibility of the main caregiver (Cassidy & Berlin, 1994) Thus, uncertainty appears as a key factor in the development of an insecure attachment style. Uncertainty is very much linked to feelings of uncontrollability which have been associated with anxiety in children (Barlow & Chorpita 1998). Evidence for the link between an insecure attachment style and childhood anxiety has been further corroborated (Warren, Huston, Egeland & Sroufe, 1997; Moss, Cyr, Dubois-Comtois, 2004; Shamir-Essakow, Ungerer & Rapee, 2005; Costa & Weems, 2005). An insecure mother-child attachment style could specifically augment the child's social anxiety (Ollendick & Hirshfeld-Becker, 2002)

It is noteworthy that mothers with an optimal attachment style could be protecting their children from developing an AD by exhibiting lower levels of parenting stress (Willinger, Endorfer-Radner, Willnauer, Jorgl & Hager 2005).This argument is supported by research that has shown that a balance of separation and closeness in the mother-child relationship can promote a healthy emotional development of both mother and child (Peleg et al. 2006).

Following Bowlby's work two parenting constructs have traditionally being examined: 1) parenting styles 2) parenting behaviours. Parenting styles have been conceptualized as a global set of parental attitudes, goals and patterns of parenting behaviours. On the other hand parenting behaviours have been conceptualized as specific kinds of parental interactions with children in specific situations (Wood et al. 2003). These two constructs have been identified as affecting children's emotional adjustment differently. Parenting behaviours would directly affect children's emotional regulation, whereas parenting styles would be a moderator of children's emotional adjustment (Darling & Steinberg, 1993). Several researchers have highlighted the role that parental cognition plays in parenting style and/or behaviours. In doing so, parental beliefs and attitudes towards the child have gained interest when examining the effects of parenting onto the child's adjustment (Kortlander, Kendall & Panichelli-Mindel, 1997; Costa & Weems, 2005; review by Bögels & Brechman-Toussaint, 2006).

Therefore within this section research on parenting styles and parenting behaviours will be first considered and then parental beliefs and attitudes.

2.10.2.1 Parenting Styles and Childhood Anxiety

Baumrind's (1968) typologies of parenting established a base for the actual research on parenting styles and their influence upon children. The author identified three typologies: 1) authoritarian parenting style 2) authoritative parenting style 3) permissive parenting style. These typologies have been operationalised by Robinson, Mandleco, Olsen and Hart (1995). An authoritarian parenting style has been operationalised as lack of parental support and the exertion of control without explanations, via physical or verbal coercion. An authoritative parenting style has been operationalised as parental support and as the exertion of discipline with explanations. Finally a permissive parenting style has been operationalised as spoiling the child and as threatening the child with punishment but not

giving it. The influence of certain parenting styles on children's emotional adjustment was early outlined by Baumrind (1968). She observed that children of authoritarian parents were more likely to be irritable, afraid and apprehensive compared to children of accepting parents. Recent research supports the argument that an accepting parenting style is linked to reduced levels of anxiety in the child (Scott et. al.,1991).

2.10.2.2 Parental Controlling Behaviours and Childhood Anxiety

Parental over control has generally been conceptualised as a pattern of behaviour involving excessive regulation of children's activities, high levels of parental vigilance and intrusion and the discouragement of independent problem- solving or decision making (Bögels & Brechman – Toussaint, 2006). Therefore parental over control is also referred to as parental overprotection (Wood et al. 2003).

Parental over controlling behaviours have been found to be associated to childhood anxiety (Kortlander et al. 1997). This association has been found to be consistent in observational studies (Whaley, Pinto & Sigman, 1999; Dumas, Serketich & Lafreniere, 1995; Hudson & Rapee, 2002, Moore, Whaley & Sigman, 2004). Less conclusive findings have been obtained with parent or child report studies (Siqueland, Kendall & Steinberg, 1996), although existing reviews demonstrate that the majority of these studies lend credence to the association between parental control and anxiety (Woods et al. 2003; Bögels & Brechman-Toussaint, 2006). Studies examining children's appraisals of parenting give further evidence for the role that parental controlling behaviours can have on childhood anxiety. For example, Muris & Merckelbach (1998) found a connection between 8-12 year olds perceptions of parental control and AD symptomatology. In line with these findings Aycicegi, Harris and Dinn (2002) found that perceived parental control predicted a broad spectrum of anxiety symptoms in female students (mean age 18.5 years), such as social anxiety or obsessive compulsive symptoms. An association between parental control and anxiety in children has been further corroborated in

adolescents but not in younger children (Costa & Weems, 2005). These findings contradict those previously obtained by Muris and Merckelbach (1998). This incongruence in the findings could be explained by an age related effect. Hence Costa and Weems (2005) suggest that young children's perception of parental control may still be developing. Therefore young children's reports on parental control could be less accurate. In order to explore this hypothesis research that considers age-effects on report studies is needed.

It should be noted that there is some empirical work that has looked at specific anxiety symptoms and parental controlling behaviours, such as the mentioned work by Aycicegi et al. (2002). Nevertheless this line of research is in its infancy and also needs further examination. Two studies have linked parental controlling behaviours with a separation anxious disorder (Wood 2006) and a separation anxious symptomatology (Giotakos & Konstantakoupoulos, 2002). Only in Wood's et al. (2006) study however, the effects of parental controlling behaviours were examined in relation to separation anxious disorders in childhood. Giotakos and Konstantakoupoulos's (2002) study examined received parental over control in childhood and separation anxiety symptoms in young male soldiers.

Despite the need to investigate age-related effects in report studies and the need to explore the effects of parental controlling behaviours on specific anxiety symptoms or AD, the current findings are indicative of an association between parental control and childhood anxiety.

A feasible explanation of why parental control could contribute to the child's anxiety is given by Wood et al. (2003). He states that when parents do not provide children with the opportunity to engage in age-appropriate self-help behaviours (i.e. dressing) children may not develop a sense of control and autonomy. This explanation fits in with Chorpita and Barlow's (1998) theory of diminished control that links the child's perception of uncontrollability (or learned helplessness) with his/her experiencing of

anxiety. Existing research further bolsters this theory when heightening the role that unpredictable parenting behaviours can have on the child's levels of anxiety (Aycicegi et al. 2002; Peleg-Popko 2002; Smith, 2004). Its is worth noting at this point that effortful control processes which are linked to ABs (see Chapter 2) facilitate the development of self-control of emotions (Fox & Calkins 2003) and serve as a protective factor lowering the levels of child conduct difficulties (Gartstein & Fagot, 2003).

2.10.2.3 Parental Warmth and Childhood Anxiety

Warmth has been characterised by the expression of positive emotion towards the child and the acceptance of the child's expression of feelings and behaviours. A lack of warmth is conceptualised as parental criticism and hostility (Bögels, Brechman-Toussaint, 2006). Observational studies on maternal warmth have consistently shown that the higher the maternal warmth, the lower the levels of anxiety in the child (Dumas et al. 1995; Whaley et al. 1999; Moore et al. 2004). However evidence that comes from report studies is less conclusive than evidence that comes from observational studies (Muris & Merckelbach, 1998; Wolfradt, Hempel & Miles, 2003). The fact that age-related effects have not been considered in report studies could account for the inconclusive findings. Hence future research would benefit from exploring the development of children's perceptions of parental warmth. In addition future research would benefit from looking at how parental warmth can serve to diminish specific anxious symptoms in the child. So far a pilot study has shown that parental praise of the child's brave behaviours can reduce the levels of separation anxiety in 4 to 8 year olds (Choate, Pincus, Eyberg & Barlow, 2005). An accepting parenting style has also been linked to less social anxiety in children (Hummel & Gross, 2001).

Studies on parental criticism have consistently found, both with self-report and observational measures, that the higher the levels of parental criticism towards the child, the higher the child's levels of anxiety (Dumas et al. 1995; Hibbs et al. 1991; Hudson & Rapee 2001). Interestingly a

prospective-longitudinal community study carried out by Lieb et al. (2000) has explored the role of adolescents' perceived parental rejection on the development of social phobia. It has found that adolescents' perceived parental rejection contributes to the development of social phobia. In line with this finding, parental shaming has also been linked to the aetiology of social phobia (review by Neal & Edelmann, 2003).

Studies on parental hostility further add to the literature on parental criticism and childhood anxiety. When looking at the hostile environment within the family, boys with a history of exposure to interparental aggression were found to be more anxious when parents showed hostility towards them in a discussion task (Gordis, Margolin & John, 1997). In addition a hostile-withdrawn co-parenting has been found to mediate the relationship between marital violence and children's anxiety or depression (Katz & Low, 2004).

To conclude it can be argued that parental warmth could operate as a protective or vulnerability mechanism (Rutter & Rutter, 1992). Therefore high levels of parental warmth could enhance resistance to the development of an anxious symptomatology- parental warmth would then operate as a protective mechanism. On the other hand a lack of parental warmth could reduce this resistance operating as a vulnerability mechanism. Future research needs to address the conjoint influence of parental warmth and parental control on childhood anxiety. Indeed it has been observed that anxious mothers are less warm in their interactions with their children and grant their children less autonomy (Woodruff-Bordern et al. 2002).

2.10.2.4. Parental Beliefs and Attitudes and Childhood Anxiety

Research on the effects of parental beliefs and attitudes on childhood anxiety is very much in its infancy. Early work by Larrance and Twentyman (1983) demonstrated the role that negative beliefs held about the child could have in abusive mothers. The authors suggested that

abusive mothers believe that their children act intentionally to annoy them. Further work has emphasized the role that parental beliefs can play on the development of AD (Rubin & Mills, 1999).The authors found that parents who believe their child was shy at 2 years of age reported more parental behaviours that discouraged the child's autonomy at age 4 years. As already mentioned in the review, discouragement of the child's independent behaviour can contribute to his/her anxiety (Kortlander et al. 1997). More recently, maternal beliefs characterised by fear of rejection have been found mediating the relationship between an anxious mother-child relationship and anxiety in the child (Costa & Weems, 2005). Further research should explore whether parental beliefs have they origin in the parent's psychopathology or in the child's behaviour. Hence as mentioned previously, the direction of effects between the parent and the child characteristics needs to be explored.

Parental beliefs and attitudes resonate with the construct of expressed emotion (EE). EE is an index of significant others' attitudes, beliefs and feelings toward an identified member of the family or patient (Fogler, Thompson, Stekettee & Hofmann, 2007). It was originally developed to assess the caregiver's feelings and thoughts towards an adult member diagnosed of schizophrenia (Brown & Rutter, 1966). Recently EE has successfully being applied in research looking at children's internalising disorders.

In paediatric samples EE is generally measured using the Five Minute Speech Sample (FMSS; Magana et al. 1986). With the FMSS the child's main caregiver is asked to talk about their thoughts and feelings towards his/her child for five minutes. A high EE score is assigned in the presence of a high critical and/or a high overprotection EE rating. A high critical EE rating is assigned in the presence of either a negative initial statement, a negative mother-child relationship rating, or one or more criticisms. A high emotional overprotection EE rating is assigned in the presence of overprotective behaviour, emotional display during the interview or any two of the following: (1) five or more positive comments (2)

excessive detail about the past (3) one or more statements of attitude, in which the mother expresses very strong feelings of love or willingness to do anything for the relative in the future (Magana et al. 1986). To date it has been observed that high EE ratings are more prevalent in parents of children with depression (Asarnow et al. 1994; McCleary & Sanford, 2002). Relationships between EE and childhood anxiety have also started to be outlined. In mothers with AD, maternal criticism has been related to children's BI (Hirshfeld & Bierderman, 1997). BI is a biological risk factor linked to anxiety (Kagan & Snidman, 1999). A mother-child negative relationship and mother's statements of dissatisfaction have also been positively associated to maternal reports of child internalising disorders such as anxiety (McCarty & Weisz 2002).

Because EE taps into intrusive and critical parental beliefs and attitudes towards the child, it can provide further insight into the understanding of parental criticism and over control in the explanation of AD. Indeed research on EE in children further corroborates the role that parental criticism plays in childhood anxiety. Nevertheless the role that a high over-protection EE rating could play in the child's anxiety warrants further investigation. So far the findings by McCarty & Weisz (2002) highlight the importance of drawing our attention to the main caregiver-child relationship.

2.10.2.5 Interim Conclusion

Recent literature on parenting and childhood anxiety has advanced our knowledge regarding parental factors involved in the transmission of anxiety onto the child. However we still have little information about pathways via which parents could be transmitting the anxiety onto the child.

2.11 Family Pathways for Transmission of Childhood Anxiety

In this section, it is aimed to explore the feasibility of a cognitive-mediated pathway via which parents could be transmitting anxiety to the child (Rapee, 2001, Ginsburg & Schlossberg, 2002). Based on the literature on cognition and childhood anxiety, it will be explored whether parents could be contributing to attentional and interpretive threat-related biases linked to childhood anxiety. Two questions will be addressed:

(1) Is there evidence for a link between parental mental health variables and threat-related cognitive biases? (2) Is there evidence for a link between parenting variables and threat-related cognitive biases?

2.11.1 Parental Mental Health and Threat-Related Cognitive Biases

Moradi et al. (1999) proposed that children exposed to high levels of parental emotional distress could show cognitive biases (i.e. threat-related ABs) by emotional contagion from the parents. A later study by Bögels, van Dongen et al. (2003) lends credence to this hypothesis. In their study children were presented with some ambiguous stories and were asked to decide what they would think and do if they were in that situation. Parents read the same stories and were asked to make similar decisions about the stories. It was found that the child's negative interpretations were associated with the parent's negative interpretations and with increased maternal anxiety. A strong link was found between the child's interpretive bias and the mother's anxiety. A later study by Creswell et al. (2005) also found that the mother's and the children's threat-interpretations were significantly correlated. In line with these studies, previous research had depicted an association between parental PD and the child's negative interpretations of panic-relevant story situations (Schneider et al. 2002). It should be mentioned however that children's interpretive bias emerged only after the presentation of a video of a panic disordered woman. This priming effect suggests that modelling could be also having an influence in the parental transmission of an anxious cognitive style onto the child. On a related note an association between parental PD and ABs towards

emotional faces in the offspring has been recently outlined (Pine, Klein et al. 2005). The aforementioned studies show a link between parental mental health and the child's threat-related cognitive biases. These studies are suggestive of a cognitive mediated pathway in which the child's attentional and/or interpretive biases would be mediating the relationship between parental mental health and childhood anxiety.

2.11.2 Parenting and Threat-Related Cognitive Biases

A study looking at parenting difficulties gives further evidence for a pathway in which interpretive biases could be a mediator in the parenting-childhood anxiety linkage (Forman & Davies, 2003). The authors found that parenting difficulties predicted adolescents internalizing symptoms via a cognitive pathway, in particular via adolescents' levels of perceived insecurity in the family.

Research on a parent-child relationship also gives evidence for a cognitive-mediated pathway. It has been found that a supportive parent-child relationship based on closeness and acceptance can reduce adolescents' appraisals of threat when confronted with interparental conflict (Grych, et al. 2004). On the other hand an anxious mother-child relationship can increase anxiety levels in 6-17 year olds via maternal anxious attachment beliefs. These maternal beliefs are characterised by anxiety regarding rejection by others and feelings of personal unworthiness (Costa & Weems, 2005). The authors suggested that mothers with anxious attachment beliefs could be sending a message to the child that particular stimuli are threatening or dangerous. A prospective study carried out by Warren et al. (2004) adds to the argument that a parent-child relationship can influence the child's cognitions. In the study narrative codes were used to analyse children's play enactments about a story. The narrative codes were suggested to tap into children's internal representations of the early relationship with their parents. Children's play enactments showing a negative interpretation about a story at age 5 years were predictive of the child's anxious symptomatology at age 6 years. These findings suggest that

an early parent-child relationship could be a cause in the child's negative interpretations of a story situation.

In line with these three latter studies, a recently developed model highlights the role that early family relationships can have on physical and psychological health via a cognitive-affective pathway (Luecken, Appelhans, Kraft & Brown, 2006). In the model it is argued that early family relationships can contribute to threat-related cognitive biases which in turn would influence the individuals' selection and implementation of self-regulatory processes. Therefore threat-related cognitive biases could have a detrimental effect on an individual's self-regulatory ability at a physiological, emotional and cognitive level. As mentioned earlier the regulation and successful adaptation of an individual may be dependent on his/her EC skills (Eisenberg et al. 2005). An individual with unadjusted self-regulatory processes could fall into maladaptive cognitive, emotional and physiological responses to daily challenges. The cumulative effects of these maladaptive responses would influence vulnerability both to physical and psychological illness.

This model sheds light on how early family relationships could influence vulnerability to physical and psychological illness. Interestingly it does so taking into account two variables that research has pointed out as crucial in the understanding of childhood anxiety: (1) threat-related cognitive biases; (2) EC skills. In addition a developmental approach in the aetiology of physical and psychological illness is taken into account when influences of cumulative effects on illness are mentioned.

2.11.3 Parental Modelling and Parental Verbal Information

The studies reviewed in this section are suggestive of the potency of parental modelling and transmission of negative information in the development of childhood anxiety. These studies give support to family environment pathways of anxiety acquisition depicted in Rapee's (2001), Muris and Merckelbach (2001) and Ginsburg and Scholessberg (2002)

models. These studies also describe evidence for Rachman's (1991) pathways to fear acquisition. Rachman (1991) posited that there are three viable pathways to fear acquisition: (1) a direct one that involves direct conditioning; (2) two indirect ones that involve: observational vicarious learning (modelling) or transmission of negative information.

Rachman stated that clinical fears would be the result of direct conditioning experiences. A traumatic aversive outcome such as a loud noise (unconditioned stimulus, US) would be associated with a neutral stimulus, such as a light. Through the association with the US the neutral stimulus ceases to be neutral and it becomes a conditioned stimulus (CS). In addition through the association with the US, the CS comes to evoke a fearful response (the conditioned response, CR). In the direct conditioning pathway a CS promotes a fearful response through its association with a traumatic outcome. Interestingly Rachman outlined two indirect pathways in which non-traumatic experiences could also be explanatory of the development of fear. These pathways are: observational vicarious learning (modelling) and transmission of negative information. In the modelling pathway parental behaviours would be crucial in the communication of anxiety onto the child, whereas in the transmission of information pathway parental cognitions would. Although further research needs to be done on the underlying rules that govern indirect pathways it is been recently shown that these rules could be the same as the ones governing a direct conditioning pathway (see review, Field, 2006a). For example in relation to transmission of negative information, several studies suggest that fear information about a stimulus could contribute to a child's fear beliefs about it via a CS-US association (Field, Argyris & Knowles, 2001;Field, Hamilton, Knowles & Plews, 2003; Field & Lawson, 2003).

A plausible explanation on how fear information about a stimulus could affect a child's beliefs is given by Field (2006a). He argues that negative information about a stimulus could act as a US. Throughout childhood a child could experience many causal learning trials in which a potentially fearful stimulus (i.e. animal) would consistently predict negative

information. Over time the negative information would act as a US and it would be associated with the potentially fearful stimulus. Through the association with the US the potentially fearful stimulus would become fearful to the child (CS). As in the direct conditioning pathway the CS would come to evoke an anxious response through its association with the negative information (US).

Hence it can be concluded that theories of conditioning are a feasible way of conceptualising how fears and anxieties might develop in the child even in indirect pathways of association (see review Field, 2006a). In the following paragraphs attention is turned to research that can give insight into the role of parental variables in the strength of a non-traumatic aversive outcome US-CS association. Research that indicates a potential US-CS association through modelling will be first reviewed.

Existing research indicates that through modelling the child can acquire emotional regulation (Denham, 1993; Gerull & Rapee, 2002). Denham (1993) investigated emotional modelling in families with pre-school children. She found that parenting which enhanced positive affect and minimised negative affect (through modelling) contributed to the child's social-emotional competence. Maternal facial expressions of fear and disgust have also been found to shape the child's emotional regulation (Gerull & Rapee, 2002). Interestingly emotion regulation is a skill closely related to self-regulatory mechanisms (i.e. effortful control -EC) that appear to be involved in threat-related attentional processes (Izard & Abe, 2004). Other recent studies are suggestive of the role of parental modelling in shaping a child's anxiety. It has been found that 7-13 year olds relied on anxiety responses observed in parents when estimating that a situation was dangerous (Morren, Muris & Kindt 2004). In line with these findings, infants aged 12 to 14 months were significantly more fearful and avoidant with a stranger following a socially anxious mother-stranger interaction compared to a non-anxious interaction (De De Rosnay, Cooper, Tsigaras & Murray, 2006). Maternal anxiety and negative interpretations have been associated with children's increased negative interpretations about ambiguous social

scenarios (Bögels, van Dongen et al. 2003).The fact that this association did not change after family discussion gives support for the hypothesis that parents could be transmitting their own negative interpretations to the child via modelling.

In summary, the reviewed research is suggestive of the impact of parental modelling to the child's anxiety. Therefore parental modelling constitutes a plausible pathway via which children could develop and/or maintain anxiety.

One question that arises at this point is the following: Is there any evidence for a transmission of information pathway? A vast amount of research highlights the effect that verbal information expressed by the parents can have on a child's anxious -related behaviour (Chorpita, et al. 1996; Barrett, Rapee, Dadds & Ryan, 1996; Field, et al. 2001; Field & Lawson, 2003).

Barrett et al. (1996) showed that anxious children interpreted social situations as more threatening and exhibited an avoidant behavioural style compared to their non-anxious counterparts. It is noteworthy that an avoidant style was enhanced after discussing the social scenarios with family members. Chorpita et al. (1996) corroborated Barrett et al. (1996) findings when they found that the link between anxiety in the children and avoidant behaviour was enhanced after family discussion of social scenarios. Dadds, Barrett & Rapee (1996) further explored the reciprocal interactions between parents and anxious children occurring during family discussions. They found that mothers of clinically anxious children agreed less with their child than did mothers of non clinic children. Moreover mothers of anxious children showed a tendency to enhance an avoidant response from the child via responding to it. The family influence on children's behavioural responses to social scenarios was labelled the Family Enhancement of Avoidant Responses- FEAR effect (Dadds et al. 1996). Further studies on the FEAR effect have shown that certain experimental contexts can facilitate the emergence of it. Specifically

experimental contexts in which the family believe that the discussion task is part of a research (treatment irrelevant contexts) and not part of a treatment (treatment relevant contexts) can facilitate the appearance of the effect (Shortt, Barrett, Dadds & Fox, 2001). Ecologically valid experimental contexts such as a videoed talk have been also found to facilitate the effect (Cobham, Dadds & Spence, 1999). Hence it could be concluded that the FEAR effect could be subject to characteristics implicit in the experimental context.

The effect of verbal information expressed by an adult has also been observed regarding a child's anxiety-related cognitions. This research however does not specifically focus on the effect of verbal information expressed by the parents. Seven to nine year olds showed a significant increase in their fear beliefs about a toy monster when an adult gave negative information about it (Field et. al. 2001). The negative information given tapped into fearful and threat-related concerns. In a later study, Field and Lawson (2003) employed pictures of Australian marsupials unfamiliar to 6-9 year olds to obtain insight into the development of animal phobias. The findings obtained corroborated those found in their earlier study. Children's fear-related beliefs about the animals increased significantly as a result of negative information given about them. These results suggest that children's expectations of the animals about which negative information had been given had become fearsome. Fear-related beliefs about social scenarios have also been found to increase as a result of negative information given about them by adults or children (Lawson, Banerjee & Field, 2007). Interestingly in a recent study Field (2006b) showed that the negative information given about unfamiliar Australian marsupials was sufficient to create an AB. Children between 7 and 9 years old showed an AB towards the animals about which negative information had been given with a pictorial dot probe task. In addition it was observed that changes in fear beliefs about the animals were mediating the relationship between negative verbal information and ABs. ABs have been extensively linked to childhood anxiety (Martin, et al.1992; Vasey et al. 1995; Vasey & MacLeod, 2001). Therefore as Field (2006b) indicates, these results suggest a

possible way in which fear information could be contributing to acquired fear or anxiety. This pathway is the cognitive-mediated pathway outlined in Rapee's (2001) and Ginsburg and Schlossberg's (2002) model. As mentioned earlier, in this pathway threat-related cognitive biases would be mediating the relationship between parental factors and childhood anxiety. However Field (2006b) also argues that negative information itself could be sufficient to the acquisition of fear or anxiety. Negative information about a stimulus could augment the child's fear beliefs about it creating anxiety in the child.

Although research on pathways to the development of fear and anxiety is warranted, the reviewed literature shows evidence for a link between negative information expressed by an adult and a child's fear beliefs. In addition a link is shown between negative information expressed by parents and a child's behavioural avoidance.

2.12 Conclusion and Future Research

It is only recently that researchers have started focusing on the investigation of AD from a developmental perspective. Therefore there is still a need to refine the I-P theoretical models that stem from adult research. To date, two cognitive factors have been identified as key variables for understanding the development of AD. The first one is the acquisition of EC as a cognitive skill. Future research should address when EC is fully acquired. The second one is the appraisal of a situation as threatening. The acquisition of abstract reasoning skills achieved in adolescence makes this cognitive distortion more likely to occur during late childhood. Therefore age appears as a crucial factor to bear in mind when looking at threat-related I-P biases. Thus, developmental considerations may also be germane to explorations of cognition in childhood anxiety (Alfano, Beidel &Turner, 2002; Hadwin, et al. 2006).

Research on ABs shows that an anxiety-related bias appears to be characteristic of children with anxiety despite the fact that capturing ABs in

children may depend on developmental factors or on the levels of anxiety in the children. In addition a threat-related AB has been consistently observed across a variety of experimental paradigms although some of the paradigms (i.e. VST, DPT) appear to be more sensitive for capturing ABs in children than others (i.e. EST). Research on interpretive biases and childhood anxiety shows consistent threat-related interpretive biases across different methodologies and throughout childhood.

It is still not clarified, however, to what extent attentional and interpretive biases are specific to childhood anxiety, as they can be related to depression. Moreover it is not clear whether these biases are a general characteristic of AD in childhood or some biases could be specific to different AD. For example in line with the adult literature an AB away from faces could be a characteristic of socially anxious children. In addition the relationship between different components of anxiety (trait vs. state) and cognitive biases needs to be explored. A recent study has demonstrated that trait anxiety is expressed through the tendency to respond with state anxiety in face of threatening situations. Therefore high trait anxious individuals would be predisposed to show the cognitive repertoire of state anxiety symptoms under threatening situations (Lau, Eley & Stevenson, 2006). On the basis of these findings it would be interesting to further investigate how state and trait anxiety would affect children's anxious-related cognitions.

The developmental pathways leading to AD are complex and multidimensional (Thompson, 2001; review by Wood et al. 2003). Together with the exploration of threat-related cognitive biases the exploration of a family environment pathway is crucial for understanding childhood anxiety (Cartwright-Hatton, 2006). Both research and etiological models of childhood anxiety describe evidence of this pathway. Several family factors have been singled out within this pathway: parental psychopathology, parental styles and behaviours, parental beliefs/attitudes towards the child and the parent-child relationship. The cumulative effects of family factors on the emergence of childhood anxiety should be borne in mind (Luecken et

al. 2006). In addition not only the contribution of maternal factors but the contribution of paternal factors to a child's anxiety needs to be considered (review by Bögels & Brechmann-Toussaint, 2006). Indeed fathers also contribute to a child's emotional development through their caretaking (Greco & Morris, 2002; review by Connell & Goodman, 2002).

A burgeoning literature on family factors and childhood anxiety has fostered theoretical advances in the understanding of anxiety. However mechanisms via which the parents could be contributing to the child's anxiety are still uncertain. For example based on the reviewed research there is a need to investigate whether threat-related attentional and interpretive biases could be mediating the relationship between parental factors (parental mental health or parenting) and the child's anxiety.

This thesis explores whether family factors can predict attentional and interpretive biases and anxiety in non-referred children. Following current developmental models on childhood anxiety (Lonigan et al. 2001, 2004; Kindt & van den Hout, 2001) the child's chronological age is taken into consideration.

2.13 Hypotheses

Based on the literature reviewed it is hypothesised that:

Regarding threat-related cognitive biases:

1.A) There will be a significant association between threat-related ABs and the levels of trait and/or separation/social anxiety in the child. This association could be a function of age (Kindt & van den Hout 2001). Thus, a threat -related AB would only emerge in older children with high levels of anxiety. Previous research highlights 10 years of age as a crucial maturational point when anxious-related ABs would be evident (Kindt et al. 1997; Williams et al. 1999). It is also hypothesised that there will be cognitive specificity in the emergence of these threat-related ABs:

1.A.1) A threat-related AB with a VST:

An AB towards and/or away from threat-related facial expressions will be significantly associated with social anxiety in children (Pine, Klein et al. 2005; Stirling et al. 2006). Based on a recent study by Stirling et al. (2006) children with social or separation anxious symptoms will show an AB towards and/or away from threat-related facial expressions.

1.A.2) A threat-related AB with a MDPT:

An AB towards/away common fears in childhood presented with pictures in the MDPT will be significantly associated with children's levels of trait anxiety (Waters et al. 2004).

It should be noted that the current literature does not provide sufficient evidence to determine whether a threat-related AB would be away or towards threat.

1. B) Threatening story situations will be significantly associated with levels of trait and separation/social anxiety in children (Muris, Luermans et al. 2000; Muris, Merckelbach et al. 2000; Bögels & Zigterman, 2000). It is expected that with higher levels of trait and separation/social anxiety, children will make more negative interpretations about threatening story situations.

2. A) Parental factors will be significantly associated with an anxious symptomatology in the child:

2.A.1) An accepting parenting style (i.e. authoritative) will be significantly associated with reduced levels of trait and separation/social anxiety in children (Scott et. al.,1991; Hummel & Gross, 2001; Choate et al. 2005). In contrast, a highly critical parenting style (i.e. authoritarian) will be significantly associated with enhanced levels of trait and separation/social

anxiety in children (Baumrind 1968; Lieb et al. 2000; Neal & Edelmann, 2003).

2.A.2) An adverse parent-child emotional relationship will be significantly associated with enhanced levels of trait and separation/social anxiety in the child (Ollendick & Hirshfeld-Becker, 2002; Costa & Weems, 2005; Peleg et al. 2006). In addition parental overprotective attitudes will be significantly associated with enhanced levels of separation anxiety in the child (Wood 2006).

2.A.3) High levels of depression in the mother will be significantly contributing to the child's separation anxious symptomatology (Biederman et al. 2001). High levels of panic/phobic anxiety in the mother will also be significantly contributing to the child's separation anxious symptomatology (Biederman et al. 2001; Kearney et al, 2003).

3) Attention and interpretive biases will mediate the effect of parental factors on children's levels of trait and/or social/separation anxiety (Rapee, 2001; Luecken et al. 2006).

CHAPTER 3
Methodology

3.1 PhD process and sampling

The PhD was carried out throughout four years. Ethical permission was granted by the departmental ethics committee (Department of Psychology, University of Southampton). Participants were recruited through primary and secondary schools in Southampton, UK. Families were sent an information letter about the study via the school. When informed consent was obtained from the families a package with the questionnaires to be completed by the main caregiver were sent to their homes. In addition, the caregiver was given a five minute interview over the phone (EE). This conversation was recorded following parental agreement and coded afterwards by the researcher, who had received training on how to code EE. It should be noted that only in three cases the main caregiver was the father.

Following parental informed consent, the children's assessment was carried out at school. For three of the children however, the assessment was carried out at home as it was more convenient for the mother and the child. The assessment took place individually in a quiet environment. At the beginning of the first session, the purpose of the study was explained to the children and they were told that their participation in the study was completely voluntary.

In order to carry out the cognitive tasks children sat approximately 60cm away from the computer screen. Before each task a protocol was read aloud to the children making sure they understood what the task involved. After the cognitive tasks, children were required to complete the self-report measures. Children were debriefed at the end of the testing.

Data collection was problematic due to the low response rate. Only half of the parents who received information letters about the study agreed

to take part in the study. Moreover only half of these parents from whom informed consent was obtained completed and returned the questionnaires. Only questionnaires completed by the mothers were included in the analysis due to the reduced availability of the fathers. Indeed only one third of the fathers completed a questionnaire about their parenting practices.

3.2 Design and Methodological Rationale

Variables measuring anxiety, depression and cognitive biases in the child were treated as continua. Variables measuring anxiety and depression in the mother were also treated as a continua. Only in Study 2 the levels of panic/phobic anxiety and depression in the mother were categorised as high or low based on the questionnaire's scoring criteria. This categorisation was carried out because in Study 2 it was aimed to recruit offspring of high-risk mothers to increase the range of anxiety and depression in the mothers.

Anxious-related cognitive biases in the child were explored from a developmental approach. Therefore it was examined whether age as a continuous variable could be moderating the relationship between attentional or interpretive biases and anxiety in the child.

Two studies were conducted. Study 1 assessed threat-related cognitive biases in non-referred children high in trait, separation or social anxiety. Study 2 focused on cognitive specificity of these biases. It specifically explored cognitive biases towards potentially social threatening stimuli in separation and socially anxious children. In order to further explore the hypotheses in the thesis a combined data set was created with participants of Study 1 and Study 2 so a maximum power could be achieved.

Questionnaires with adequate psychometric properties were used in the thesis to assess the child's and the mother's mental health variables.

Two informants (mother and child) completed the questionnaires that assessed the child's levels of anxiety and depression. Employing two informants has been found to be a valid option when diagnosing disorders in children (De los Reyes & Kazdin, 2005).

Cognitive tasks were put side by side to examine attentional and interpretive biases in the child. They were not directly adopted from adult's research. They were designed so they could be sensitive to children's threat-related attentional and interpretive biases.

To assess ABs two measures were employed, a Modified Dot Probe Task (MDPT) and a Visual Search Task (VST). Although both tasks tap into attentional processes, the attentional mechanisms involved in their performance differ. In the VST, participants are explicitly asked to search for emotional faces, whereas in the DPT participants are asked to detect the colour of the dot that appears after the emotional stimuli. Hence the VST requires the participants to detect the emotional stimulus whereas the DPT allows the participants to allocate their attention freely; the participants can allocate their attention to the threatening stimulus or divert their attention from it. The importance of highlighting the difference between these two paradigms stems from adult research on social phobia that has pointed out that attention allocation could be influenced by situational contingencies (Chen, Ehlers, Clark & Mansell, 2002). Indeed it has been found that when social phobic individuals perform a DPT in which they can choose whether or not to attend to the threatening stimulus, they show an attentional preference to look away from the stimulus (Chen et al. 2000). On the other hand when social phobic individuals perform a VST, in which they have to search for a threatening stimulus, they show vigilance towards threat, being faster to detect angry faces than happy faces in a crowd of neutral faces (Gilboa-Schechtman, Foa & Amir, 1999).

Another difference between the VST and the MDPT is that the VST used in the PhD was useful for assessing both attentive and pre-attentive processing whereas the MDPT was only useful for assessing attentive

processing. In the MDPT, the pictorial stimuli were presented for 500 ms, a time of exposure that captures attentive processing. A VST allows researchers to investigate attentive and pre-attentive processing by considering slopes and intercepts (Chun & Wolfe, 1996).The gradient of slopes indicates the extent to which reaction times (RTs) increase across target present and absent trials with an increasing set size. RTs in the intercepts indicate overall task difficulty. They are represented by the point where the slope crosses the Y axis (Hadwin et al. 2003). RT/ Slope gradients indicate the additional time added to overall RTs as a consequence of processing each stimulus (ms/per stimulus). A gradient below 10 ms/item is often considered as shallow and is indicative of parallel search. In a parallel search there is a pop out effect in which the detection latency for the target is independent of the total number of stimuli presented in a single display (set size). Therefore, RTs do not increase when distractor items are added to the search. In this case the search occurs pre-attentively. A pre-attentive search is also characterised by low RTs in the intercepts. A gradient that exceeds 20 ms/item is considered as steep and is indicative of serial search. In a serial search the detection of the target is dependent on the number of distractors presented. Therefore, RTs increase as distractors items are added to the search. Thus in this case the search occurs attentively (Wolfe, 1998).

Taking into account the different stimuli employed in the VST (facial stimuli) and in the MDPT (pictorial stimuli) cognitive specificity in ABs were also explored. In order to do so it was examined to what extent social relevant stimuli such as faces would capture the attention of socially anxious children but not of children with general levels of anxiety. In addition it was examined to what extent threatening pictures depicting general common fears in children would capture the attention of children with general levels of anxiety but not of socially anxious children. Adult research have successfully employed the MDPT to capture ABs for emotional faces in anxious adults (Bradley et al. 1997). The rationale for employing pictures and not faces in the MDPT of this thesis stemmed from a study by Waters's et al. (2004). They argued that a failure of finding a

threat-related AB in clinically anxious children could be due to the pictorial stimuli not having enough threatening value. However they only employed pictures depicting animal threats (i.e. sharks, spiders, snakes). In the thesis it was aimed to explore Waters's et al. (2004) argument by employing not only pictures capturing animal threats but a wide range of common fears in childhood.

To assess interpretive biases a story task paradigm was employed because this paradigm has been successfully employed to capture interpretive biases in non-referred high anxious (Muris, Luermans et al. 2000) and socially anxious children (Muris, Merckelbach et al. 2000).

It should be mentioned that the measures employed in Study 1 and Study 2 were similar. The main difference of the methodology employed in Study 1 compared to the methodology employed in Study 2 is that in Study 2, the measures were chosen so cognitive biases to specific anxious symptomatologies could be captured.

Since the analytical approach taken in the thesis is relevant to the methodology, it is explained further below. Bonferroni correction was not applied for any of the multiple comparisons carried out. This decision was made based on critical reviews that highlight methodological drawbacks of applying Bonferroni correction (Bland & Altman, 1995; Perneger 1998; Nakagawa, 2004). Some methodological drawbacks pinpointed are: (1) the reduction of power, increasing the likelihood of Type II error (not rejecting H_o when H_o is false) (2) publication bias (e.g exploratory investigations, that involve multiple comparisons, which are informative and could contribute to the advance of the field, would be at risk of not being published) (Nakagawa, 2004). Instead of applying Bonferroni correction and following Nakagawa (2004) and Jennions and Moller (2003) recommendations, the standardized effect size (i.e., Pearson's r) is reported in each of the multiple comparisons conducted. Reporting effect sizes will allow researchers to assess the importance of the effects found (McLeod et al. 2007). To calculate effect sizes for the t-tests the equation from Rosnow and

Rosenthal (2005) that converts a t-value into an r-value was employed: $r = \sqrt{t^2/t^2+df}$.

Only for the pre-analyses of the VST, bonferroni correction was applied to be consistent with previous analyses carried out to investigate general effects of the task (Hadwin et al. 2002; Hadwin et al. 2003).

3.3 Measures

Throughout the PhD it was aimed to measure the same critical variables, such as the child's anxiety and the child's cognitive biases or the parent's anxiety and childrearing practices, however the measures used in Study 1 were modified and refined for Study 2. When describing the measures used in the thesis it is specified which measures were employed in Study 1 or Study 2. A rationale for the change in the methodology is also given. When the sample of Study 1 and Study 2 was pulled together the measures common to both studies remained.

3.3.1 Child Mental Health

For Study 1 and Study 2 the Revised Child Anxiety and Depression Scales – Child Version (RCADS) was employed. The RCADS is a 47 item self-report measure that assesses symptoms of DSM IV-defined anxiety disorders and depression (Chorpita, Yim, Moffitt, Umemoto & Francis, 2000). For each item the child is asked to decide how often each of the statements in the questionnaire occurs to them in a 4-point Likert scale. It was developed by Chorpita et al. (2000) as an adaptation of the Spence Children's Anxiety Scale (Spence, 1998). The RCADS consists of six scales, tapping into separation anxiety disorder, generalised anxiety disorder, panic disorder, social phobia, obsessive compulsive disorder and depression. Two total scores are derived from these scales: a trait anxiety score (RCADS total score) and a combined trait anxiety/depression score (RCADS anxiety/depression total score). The scales have been found to have adequate internal consistency α = 0.70-0.80 and test-retest stability r

= .65-.80 (Chorpita et al. 2000). In addition, the RCDAS has been found to have adequate validity (Chorpita et al. 2000). Indeed the authors demonstrated that RCADS scores significantly correlated with other childhood measures of anxiety such as the Revised Children's Manifest Anxiety Scale (RCMAS) by Reynolds and Richmond (1978). For each scale T scores of 65 or higher are at the borderline clinical threshold. Total scores of the questionnaire can vary from 0 to 141.

Only for Study 1 the State-Trait Anxiety Inventory for Children (STAIC) was employed. For Study 2, the STAIC was not employed because in Study 2 it was aimed to assess cognitive biases specific to anxious symptomatologies and the STAIC assesses general levels of anxiety. It is a 40 item self-report measure with one scale that assesses state anxiety and another scale that assesses trait anxiety. It was developed by Spielberger (1970) and it is a psychometrically valid and reliable questionnaire. The state scale measures transitory anxiety states and consists of 20 items. The trait scale measures stable individual differences in anxiety proneness and consists of 20 items. In the state scale the child is asked to report how he/she is feeling at the present moment on a 3-point Likert scale. In the trait scale the child is asked to describe how he/she usually feels on a 3-point Likert scale. Scores for each scale can vary from 0 to 40.

The RCADS and STAIC questionnaires are included in Appendix A.

3.3.2 Cognitive Tasks

3.3.2.1 The Visual Search Task (VST)

Attentional biases towards/away from angry faces were explored with a VST both in Study 1 and in Study 2. The VST employed in this study is based on Hadwin's et al. (2002) search paradigm.

The Stimuli were configured using a set of black and white schematic faces of 40mm in diameter. Stimuli remained on the screen until

the child gave a response. The target face was formed with three sets of features (eyebrows, eyes and mouth) to represent angry, neutral and happy faces. Distractor items were formed by inverting the features from the target faces into non facial configurations. For an example of an angry, happy and neutral face with their correspondent distractor see Figure C1 in Appendix C. There were three conditions: (1) angry condition, in which a target angry face could be present or not, (2) happy condition, in which a target happy face could be present or not, (3) neutral condition, in which a neutral happy face could be present or not. The presentation of each of the conditions was counterbalanced. Children were told to press the Y (yes) button in a Superlab 6 key response, when they found the target face and press the N (no) button when they could not find it. The location of the Y and N buttons was counterbalanced.

The trials were presented in a random order in a Superlab programming environment. In half of the trials the target face was present and in half of them it was absent. Trials in which the target was present consisted of one target face and one distractor (set size 2) one target face and three distractors (set size 4) and one target face and five distractors (set size 6). Trials in which the target was absent consisted of two four or six distractor items. For each emotion condition, 24 trials of each set size, 12 with target present trials and 12 with target absent trials were presented. The "target present" condition was an indicator of enhancement or avoidance of the stimuli presented (Rinck, Becker, Kellermann & Roth, 2003). The "target absent" condition indicated search strategies in the children (Chun & Wolfe, 1996).

Search strategies in the target absent condition inform about the nature of the distractors and about how the distractors can influence the termination of a search. It is been argued that an adult will decide that a target is not present based on an activation threshold mechanism. According to this mechanism people would search through distractors that have a likelihood of being a target and ignore those items dissimilar to the target. The activation threshold mechanism is being developed in the

context of the Guided Search Model (Wolfe, Cave & Franzel, 1989). This model holds that attention is guided towards a candidate by processes that activate items possessing one or more target features. Distractors that have a likelihood of being a target will have more target features than distractors dissimilar to the target. Hence they will receive more activation. Whenever a distractor has a high activation, RTs in the search task will increase because the distractors will have to be checked and rejected in a serial search before the individual can decide that the target is not present (Chun & Wolfe, 1996).

Considering target absent conditions when a threat-related enhancement or avoidance effect is found is worthwhile. For example it can help researchers rule out that the threat-related ABs observed are a product of an altered search mechanism in anxious individuals. Indeed there is some empirical evidence that has shown that anxious individuals may have altered gaze behaviour tendencies (Janelle, 2002).

Target absent conditions were also employed as an index of reliability of the visual search task. Previous research using this paradigm with children has found larger effects of target with greater set sizes showing that reaction times increased on absent compared with present trials in a ratio of approximately 2.5:1 (see Hadwin et al. 2003).

3.3.2.2 The Modified Dot Probe Task (MDPT)

In Study 1 a pictorial version of the dot probe (MDPT) was used. The dot probe task employed in the study is based on Bradley's et al. (1997) dot probe paradigm. For Study 2 it was aimed to explore anxious-related ABs to potentially threatening facial stimuli in children with social or separation anxiety, thus the MDPT was not employed.

Twenty threatening black and white pictures were paired with 20 neutral black and white pictures to make up the critical trials. The pictures were designed based on the Koala Fear Questionnaire (KFQ) (Muris,

Meesters, Mayer et al. 2003). The KFQ is a standardized self-report scale for assessing fears in children aged 4 to 12 years. The fears represented in the pictures were related to: (1) medical issues and physical injuries (i.e. someone hurt); (2) danger and death (i.e. a lightning); (3) fears of the unknown (i.e. a ghost); (4) scary animals (i.e. a spider). Examples of critical trials are: (1) someone hurt- a bell; (2) a lightning- a clock; (3) a ghost- a bell; (4) a spider- a comb. See Figure C2 in Appendix C for an example of a critical trial.

Twenty neutral black and white pictures were paired with other 20 neutral black and white pictures to make up the neutral trials. Examples of neutral trials are: (1) a cake- a butterfly; (2) a little bird- a cup; (3) a drum- a seal; (4) a carrot- money.

Each of the paired pictures was presented on the left or right side of the computer with equal frequency on a Superlab programming environment. The distance between the pictures was of 100 mm approximately. The paired pictures were presented for 500 msec after a fixation cross and were followed by a squared-shaped dot (1x1 cm). The square- shaped dot could appear at the vicinity of a threatening or neutral picture. Therefore there were two conditions: (1) a threat-probe off condition in which the dot appeared in a different location from the threat stimulus (2) a threat-probe on condition in which the dot appeared in the same location as the threat stimulus. The AB score was calculated from subtracting the reaction times (RT) in the threat probe off condition from the RT in the threat probe on condition. A positive value indicated a shift of attention towards threatening pictures relative to the neutral pictures.

3.3.2.3. The Story Task

In order to assess an interpretation bias to threat a story task paradigm was used following Muris, Luermans's et al. (2000) and Muris, Merckelbach's et al. (2000) work. Despite a story task paradigm was used in Study 1 and in Study 2 the stories in each of the studies differed. In

Study 1 the stories tapped into general social and physical anxious concerns whereas in Study 2 the stories specifically tapped into separation, generalised and panic anxious concerns.

In Study 1 eight stories were presented to the children, four of them threatening and four of them ambiguous (see Appendix D, subsection D1). Two of the threatening stories were related to social threats and the other two were related to physical threats. Example of a socially threatening story is: This is Fiona. Fiona sees Billy across the street and waves to him. Billy doesn't wave back. Example of a physically threatening story is: Peter is in bed. He hears a noise in the hallway. Two of the ambiguous stories were also related to social threats and the other two to physical threats. Example of a socially ambiguous story is: Tina's having a birthday party. In school she meets some invited children; they tell her they are looking forward to her party. Example of a physically ambiguous story is: Elizabeth pushes Jane up and down on the swing. Jane likes Elizabeth to push her really high. The pictures were black and white drawn with Word Paint and were adapted from Howlin, Baron-Cohen and Hadwin (1999).

In Study 2 eleven stories were presented to the children. Five of the stories tapped into separation anxious concerns, three of the stories tapped into panic anxious concerns and three of the stories tapped into generalized anxious concerns (see Appendix D, subsection D2). The stories were designed based on previous work looking at interpretive biases in separation and social anxiety (Bögels & Zigterman, 2000; Schneider et al. 2002). The scenarios in the stories were configured with black and white electronic pictures.

In Study 1 children were told to decide what the main character in the story is thinking and what they would think if they were in that same situation. In Study 2 children were told to decide what the main character in the story is thinking.

In both studies for each story situation three options tapping into a positive, negative or neutral interpretation of the situation were given. The order of the options was counterbalanced. If a positive option was chosen a value of 0 was assigned. If a neutral option was chosen a value of 1 was assigned. If a negative option was chosen a value of 2 was assigned.The number of negative interpretations made for each story was calculated. Each story situation with its options was presented on a computer screen in a random order using a Superlab programming environment.

Firstly the children were presented with a picture and few sentences below each picture describing the story situation. Secondly the children were presented with the picture describing the story situation and the three options below the picture.

3.3.2.4 Psychometric Properties of the Cognitive Tasks

3.3.2.4.1 The VST

To assess the reliability of the VST separate functions for target absent and target present trials were computed. Previous research employing this paradigm with children has found larger effects of target with greater set sizes showing that reaction times increased on absent compared with present trials in a ratio of approximately 2.5:1 (see Hadwin et al. 2003). Using presentation trials with different set sizes allows a calculation of a slope gradient which reflects the extent to which reaction times change across different set sizes.

RTs and errors for the different faces were analysed in a 3 (emotion condition: angry, happy, neutral) x 2 (target: present, absent) x 3 (set size : 2, 4, 6) repeated measures ANOVAs. Any reaction time (RT) above or below 2.5 standard deviations from condition means was excluded from the analysis. The main effects of emotion (F (2,128) = 21.28, $p < 0.01$), target (F (1,128) = 228.67, $p < 0.01$) and set size (F (2,128) = 604.21, $p < 0.01$) were significant. These indicated that children were slower to search for neutral (M = 1707.51 ms, SE = 46.71) compared with happy (M = 1577.66

ms, SE = 39.36) and angry (M = 1575.33 ms, SE = 43.61) faces; were faster in target present (M = 1454.27 ms, SE = 36.26) compared with target absent (M = 1786.06 ms, SE = 48.19) trials; and searched faster in set size two (M = 1274.96 ms, SE = 33.41) compared with set sizes four (M = 1614.74 ms, SE = 42.11) and six (M = 1970.78 ms, SE = 51.05). There were also significant interactions between emotion and set size (F (4, 128) = 6.43, $p < 0.01$) and between target and set size (F (2,252) = 117.08, $p < 0.01$); indicating that slower RTs for neutral compared with happy and angry faces were more evident in set sizes four and eight compared with set size two and that RTs to find target faces increased with set size at a ratio of 2.5:1. See Table F1 (Appendix F). A target and emotion interaction effect was not found which is consistent with previous research (Öhman et al. 2001).

The gradient of slope for each target face was calculated. In all cases these exceeded 20 ms/item; which is indicative of attentive and not automatic processing (Wolfe et al. 1989). A linear trend analysis was carried out for each target face to examine whether the gradient of the slope for each target face linearly increased with set size. Consistent with previous research (Hadwin et al. 2003) for all target faces the amount of variance accounted for by a linear component was significant in all cases $R^2 > .92$. Therefore the gradient of slope for each target face increased linearly with set size. See Figures 7 and 8.

Results for the errors committed in the VST can be found in Appendix E. In line with Hadwin's et al. (2003) findings the main effects of Emotion and Target were observed. In addition a main effect of Set Size was observed. In line with Hadwin's et al. (2003) findings significant interactions between Emotion and Target and between Emotion and Set Size were found.
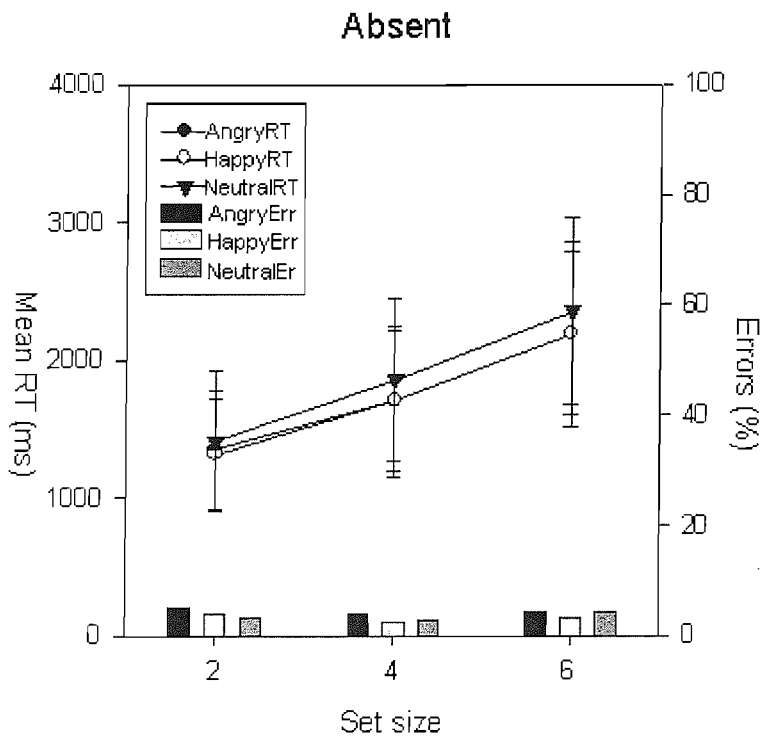
Figure 7. Mean reaction times and errors for the target absent angry, happy and neutral conditions
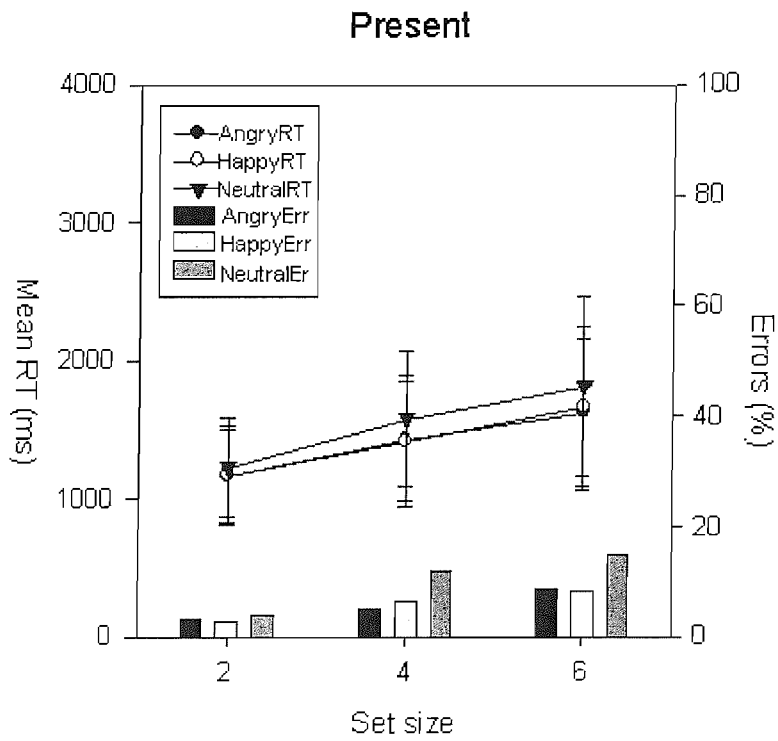
Figure 8. Mean reaction times and errors for the target present angry, happy and neutral conditions

3.3.2.4.2 The MDPT

Any RT above or below 2.5 standard deviations from condition means were omitted from the analysis.

Following previous research a main effect of threat value was expected. The presence of threatening information would interfere with probe responding and RTs would increase with increased threat value (Koster, Crombez, Verschuere & De Houwer, 2004). Several *t*-tests compared the neutral paired stimuli (N-N), with the two stimuli conditions of the threatening paired stimuli (Threat probe Off and On). It was found that response to N-N trials was significantly quicker (M = 591.58 *ms, SE* = 17.67) than response to Threat probe Off trials (M = 598.86 *ms, SE* =18.63) ($t(70)$ = - 2.14, $p < .05$, r = .24). Response to N-N trial was also found quicker (M = 591.58 *ms, SE* = 17.67) than response to Threat probe On trials (594.89 *ms, SE* = 19.01). This difference was however not significant ($t(70)$ = - .74, p = .46). These results are in line with Koster's et al. (2004) findings and indicate that threatening information interfere with probe responding.

Previous research has also acknowledged that non-selected children would detect the dot probes on the threat probe on condition more quickly than on the threat probe off condition (Waters et al. 2004). Research on adults has found the same pattern of results (Mogg & Bradley 1998). A one – way repeated measures ANOVA was carried out to compare RTs and errors for the two stimuli conditions (Threat probe Off vs. Threat probe On). However for RTs, there was no significant effect for stimulus condition ($F(1, 70)$ = 1.03, p = .31). This result casts doubt on the reliability of the task.

For errors there was a significant main effect for stimulus condition (Wilk's Lambda = .71, $F(1, 70)$ = 27.90, $p < .01$, multivariate partial eta squared = .28). Wilk's Lambda was used because sphericity was violated. A paired sample *t*-test was conducted to identify in which stimulus condition

more errors were made. It was found that significantly more errors were made when the threat pictures appeared in the same location as the dot probe (mean errors = 10.9 %) compared to when they appeared in a different location (mean errors = 7%). Based on previous research an error rate of less than 15% was found acceptable (Brosch, Sander & Scherer, 2007).

3.3.2.4.3 The Story Task

To assess the reliability of the story task the number of negative interpretations made across the story conditions in Study 1 was looked at.

To explore whether the number of negative interpretations made differed across the story conditions a 2 (Story: ambiguous vs. threatening) x 2 (Event: social vs. physical) x 2 (Judgement: self vs. other) repeated measures ANOVAs was carried out. The main effects of Story ($F(1, 70)$ = 24.39, $p < .01$) and Event ($F(1, 70)$ = 27.32, $p < .01$) were found. As expected significantly more negative interpretations were made in the threatening stories (M = 2.54, SE = .20) compared to the ambiguous stories (M = 1.30, SE = .17) ($t(70)$ = 4.93, $p < .01$, r = .50). Significantly more negative interpretations were made for physical events (M = 2.5, SE = .21) compared to social events (M = 1.33, SE = .14) ($t(70)$ = 5.22, $p < .01$, r = .52). This finding is in line with the developmental course of fears in childhood. Although around 5 to 6 years of age social fears emerge (Ollendick et al. 1985), physical fears (i.e. not being able to breathe, fears of a burglar breaking into one's house) have been found to be at the top in the fear rank orders of 8-13 year olds (Muris, Merckelbach, Mayer & Prins, 2000).

There was a significant interaction between Story, Event and Judgement ($F(1, 70)$ = 5.49, $p < .05$), in which more negative interpretations were made for self-judgements in the threatening physical stories.

The story task of Study 2 consisted of stories depicting generalised, panic and separation anxious concerns. There were no Judgement (Self vs.Other) or Story conditions (ambiguous vs. threatening). To examine the reliability of this task the mean number of negative interpretations made for generalised, panic and separation anxious concerns were compared. Three paired sample t- tests were conducted. It was found that significantly more negative interpretations were made for stories depicting panic anxious concerns (M = 1.45, SE = .15) compared to stories depicting generalised (M = .86, SE = .10) ($t(50)$ = -3.39, $p < .01$, r = .43) or separation anxious concerns (M = 1.14, SE = .08) ($t(50)$ = 2.05, $p < .05$, r = .27). In addition significantly more negative interpretations were made for stories depicting separation anxious concerns compared to stories depicting generalised anxious concerns ($t(50)$ = -2.06, $p < .05$, r = .27). Consistent with the findings of the story task in Study 1 stories tapping into physical threats, such as the panic anxious stories, were the ones in which children made more negative interpretations. This finding argues in favour of the reliability of the story task in Study 2.The panic anxious stories were referring to situations in which the child was 1) feeling dizzy and short of breath 2) having difficulties in catching the breath 3) feeling the heart racing and hot. Some of the separation anxious stories were also tapping into physical threats. See Appendix D (subsection D2).

3.3.2.5 Correlations among the Cognitive Tasks

To explore whether the cognitive tasks tapped into different threat-related attention and interpretive mechanisms, various Pearson's correlations (two-tailed) among the VST, the MDPT and the Story Task were carried out. These correlations were an index of validity of the different tasks, indeed they indicated whether these tasks provided measures of the same construct.

Three tables of correlations are presented. In the first table, correlations of the cognitive tasks of Study 1 are shown (Table 1). In the

second table, correlations of the cognitive tasks of Study 2 are shown (Table 2). In the third table, data from Study 1 and Study 2 is combined to further assess the validity of the tasks (Table 3). Two new variables depicting threat-related interpretive biases are computed from the story task in Study 1 and in Study 2.

Table 1 shows that the VST variables did not significantly correlate with the dot probe bias score nor did they correlate with positive, neutral or negative interpretations of the stories in the story task. This finding indicates that the tasks in Study 1 were measuring different cognitive processes. The fact that the dot probe bias score did not significantly correlate with the variables in the VST suggest that the MDPT and the VST are tapping into different attentional mechanisms. This finding is in line with the hypothesis that in the MDPT participants can divert their attention from the threatening stimuli whereas in the VST participants are asked to focus their attention on the threatening stimuli (Chen et al. 2002). Interestingly a commentary on cognitive biases by Dalgleish et al. (2003) puts forth the argument that tasks that have been used as measures of threat-related ABs (i.e. the DPT and the EST) are isomorphic, thus they do not measure the same construct.

The dot probe bias score appeared to be negatively correlated with neutral interpretations of physical stories ($r = -.25$, $p < .05$). This result is unexpected as the MDPT and the story task measure different processing mechanisms. The story task paradigm has successfully been used for assessing threat-related interpretive biases (Muris, Luermans et al. 2000; Muris, Merckelbach et al. 2000; Muris et al. 2005). A recent meta-analytic study argues in favour of the psychometric value of the dot probe paradigm for assessing threat-related ABs in anxiety (Bar-Haim et al. 2007). Nevertheless there is research that suggests that the dot probe task is unreliable in non-clinical samples (Schmukle, 2005). Therefore the negative correlation found between the dot probe bias score and the neutral interpretations of physical stories could be explained by the unreliability of the dot probe task used in the thesis (see previous section). In this task

pictorial stimuli depicting general worries in childhood were used (Muris, Meesters, Mayer et al. 2003). Other dot probe tasks employing fear-related pictorial stimuli have been found not sensitive for capturing a threat-related AB in clinically anxious children (Waters et al. 2004).

The correlations observed among the variables in the story task of Study 1 give evidence for the validity of the task. It was found that positive interpretations of social stories were significantly negatively correlated with the negative interpretation of these stories ($r = -.51$, $p < .01$). Positive interpretations of social stories were also found to be significantly negatively correlated with the neutral interpretation of these stories ($r = -.61$, $p < .01$). This last correlation is somewhat surprising; however, empirical work suggests that neutral stimuli could have an ambiguous value which could be appraised as threatening (Cooney et al. 2006). No significant correlations were found between social and physical stories which suggests that these stories were measuring different anxious concerns. This result argues in favour of the discriminant validity of the task. In addition like for the social stories, for the physical stories it was found that positive interpretations were significantly negatively correlated with the negative ($r = -.52$, $p < .01$) and neutral ($r = -.26$, $p < .05$) interpretation of these stories.

Table 1

Correlation table of the VST variables (angry, happy, neutral slopes) the Dot probe Bias score and the interpretations of social and physical stories

	1	2	3	4	5	6	7	8	9	10
1. Angry Present Slopes	1	.35**	.35**	.04	.00	-.04	-.07	.00	.07	.06
2. Happy Present Slopes		1	.34**	.03	-.06	.11	.02	.06	.05	-.09
3. Neutral Present Slopes			1	-.27*	.06	.12	-.15	.03	.09	-.20
4. Dot probe Bias Score				1	-.05	.14	.04	-.25*	.01	-.06
5. Positive Interpretation Social stories					1	.15	-.61**	-.01	-.51**	-.10
6. Positive Interpretation Physical stories						1	.01	-.26*	-.20	-.52**
7. Neutral interpretation Social Stories							1	.09	-.36**	.06
8. Neutral interpretation Physical Stories								1	-.08	.32**
9. Negative interpretation Social stories									1	.05
10. Negative interpretation Physical stories										1

* $p < .05$, ** $p < .01$ (two-tailed)

In Table 2 it is shown that the variables in the VST were not significantly correlated with the variables of the story task in Study 2. These findings replicate those obtained for Study 1. Interestingly correlations of the variables in the story task showed that negative interpretations of panic-related stories were more strongly correlated with negative interpretations of separation-related stories ($r = .45$, $p < .01$) than with negative interpretations of generalised stories ($r = .29$, $p < .05$). This finding is in line with what would be expected as separation and panic anxious concerns have been related in the literature (Bierderman et al. 2001; Kearney et al. 2003).

Corroborating the findings in Study 1 a pattern of results was observed in which positive interpretation of the stories were significantly negatively correlated with negative interpretation of the stories. In addition positive interpretation of the stories were significantly negatively correlated with neutral interpretation of the stories. Only for the panic stories no significant negative correlation was found between the negative and positive interpretation of the stories. The relationship between the negative and positive interpretation was however in the right direction ($r = -.15$, ns)

Table 2

Correlation table of the VST variables (angry, happy, neutral slopes) and the interpretations of panic, separation and generalised stories

	1	2	3	4	5	6	7	8	9	10	11	12
1. Angry Present Slopes	1	.42**	.46**	.22	.16	-.29*	.14	.01	-.16	.02	.06	-.07
2. Happy Present Slopes		1	.38**	.13	.13	-.19	.02	.08	-.10	-.17	.00	.18
3. Neutral Present Slopes			1	.13	-.06	-.09	.10	-.10	.00	.08	.08	-.15
4. Negative interpretation of panic-related stories				1	-.15	-.88**	.45**	-.27*	-.16	.29*	-.07	-.25*
5. Positive interpretation of panic-related stories					1	-.32*	.18	.01	-.19	-.05	-.01	.07
6. Neutral interpretation of panic-related stories						1	-.52**	.26*	.25	-.25	.08	.21
7. Negative interpretation of separation-related stories							1	-.53**	-.44**	.19	.00	-.22
8. Positive interpretation of separation-related stories								1	-.52**	-.23	-.02	.27*
9. Neutral interpretation of separation-related stories									1	.05	.02	-.07
10. Negative interpretation of generalised-related stories										1	-.45**	-.73**
11. Positive interpretation of generalised-related stories											1	-.26*
12. Neutral interpretation of generalised-related stories												1

* $p < .05$, ** $p < .01$ (two-tailed)

Table 3 shows that the anxious-related biases in the VST (angry slopes) or the MDPT (dot probe bias score) were not significantly correlated with the two variables that combined negative interpretations of social scenarios with separation or panic anxious scenarios. This finding again gives evidence to support that the VST, the MDPT and the story task tap into different processing mechanisms. As expected the two combined variables (social and separation anxious stories, social and panic anxious stories) were positively correlated ($r = .67$, $p < .01$).

Table 3

Correlation table of anxious-related biases in the VST (angry slopes) and the MDPT (dot probe bias score) and negative interpretive biases of stories depicting social, panic and separation anxious concerns

	1	2	3	4
1. Angry Present Slopes	1	.09	.02	.03
2. Dot probe bias to threat		1	-.05	-.05
3. Negative interpretation of social and panic stories			1	.67**
4. Negative interpretation of social and separation stories				1

*$p < .05$, ** $p < .01$ (two-tailed)

3.3.3 Children's Pro-rated IQ

In order to explore whether children's performance in the cognitive tasks could be affected by their IQ a short version of the Wechsler Intelligence Test for Children-III UK (WISC-III) (Wechsler 1992) was used in Study 1.

The WISC-III is a well validated and reliable measure of general intelligence for children aged 6 to 16 years. It provides an overall measure of ability (total IQ score) together with verbal and performance IQ scores. In its full form it comprises of 13 subtests. However in this study we employed a short version of the WISC-III which consists of four subtests: two

performance subtests (1-picture completion; 2-block design) and two verbal subtests (1-information; 2-comprehension). This short version has been found to be a reliable and valid measure to obtain an approximate IQ (Hunter et al. 1989).

3.3.4 Maternal mental health

3.3.4.1 Levels of Anxiety

In Study 1, the general levels of anxiety in the mother were measured. To do so the trait scale of the State - Trait Anxiety Inventory for adults (STAI) was used. In Study 2 it was specifically aimed to explore the influence of maternal panic/phobic anxiety on children's separation anxiety, therefore the STAI was substituted for the Beck's Anxiety Inventory (BAI) and for the Albany Panic and Phobia Questionnaire (APPQ).

The STAI is a 20 item self-report scale with proven reliability and convergent and discriminant validity with other measures of anxiety (Spielberger 1983). Each STAI item is given a weighted score of 1 to 4. Scores for the trait scale of STAI can vary from 20 to 80.

The BAI (Beck, Epstein, Brown & Steer, 1988) is a 21-item self-report measure used to assess symptoms of anxiety that are minimally shared with those of depression. Some authors have noted that the strongest quality of the BAI is to assess paniclike symptoms of anxiety rather than general anxiety symptoms (Leyfer, Ruberg & Woodruff-Borden, 2006). In the BAI respondents are asked to read a list of symptoms and asked to decide how much they have been bothered by them during the past week. The options are based on a four-point Likert type scale from "not at all" to "severely". The total BAI score is the sum of all items and ranges from 0 to 63. Scores of above 8 reflect some signs of anxiety. Scores of 8-15 reflect mild anxiety, scores of 16-15 reflect moderate anxiety and scores of 26-63 indicate severe anxiety. The instrument has valid internal

consistency (α = 0.92) and high-retest reliability (r = 0.75) (Beck et al. 1988).

The APPQ (Rapee, Craske & Barlow, 1994) is a 27-item self-report questionnaire that measures fear of situations and activities that are often avoided by people suffering from panic, agoraphobia or social phobia. Respondents are asked to rate on a nine-point scale (0- no fear to 8-extreme fear) the amount of fear they think they would experience in each of the 27 situations stated if they were to occur in the next week. Three subscale scores are calculated as follows: agoraphobia subscale (sum of items 2,11,13,14,16,18,20,25,27) social phobia subscale (sum of the items 1,5,8,9,12,15,21-24) and interoceptive subscale (sum of the items 3,4,6,7,10,17,19,26). In Study 2 the interoceptive subscale was employed to assess the levels of panic anxiety in the mother. The agoraphobia and social phobia subscales were employed to assess the levels of phobic anxiety in the mother. The APPQ shows a good to excellent internal consistency for each subscale (α coefficient ranging from .87 to .90) and adequate test-retest reliability for the three subscales (Rapee et al. 1994). The high validity of the instrument has also been established (Rapee et al. 1994).

3.3.4.2 Levels of depression

In Study 1 and in Study 2 the revised Beck's Depression Inventory (BDI-II) (Beck, Steer & Brown 1996) was used to measure the general levels of depression in the mother. It is a 21-item self-report inventory with proven validity and reliability (Beck et al. 1996). It assesses the presence and severity of symptoms of depression as listed in the DSM-IV (1994) in a 4-point Likert scale. The items tap cognitive, behavioural, affective, and somatic symptoms. The total BDI score is the sum of all items and ranges from 0 to 63. The BDI-II has been identified as an appropriate instrument for screening depressive disorders in the general population. A score in the BDI-II of 12/13 and above has been established as a cut off point that

indicates that the non-referred individual is suffering from a depressive symptomatology (Lasa, Ayuso-Mateos, Vazquez-Barquero, Diez-Manrique & Dowrick, 2000).

3.3.5 Maternal Reports of the Child´s Anxiety and Depression

The Revised Child Anxiety and Depression Scales - Parent Version (RCADS-P) was used in Study 1 and in Study 2. The items are the same as in the RCADS administered to the child. The only difference between the RCADS and the RCADS-P is that the wording in every item is changed from "I" to "My Child" and it is completed by the parent. The RCADS-P has a high internal consistency coefficient (α ranging from .92 to .97) and high convergent validity (r = .77 to .94) (Costa & Weems, 2005).

3.3.6 The Expressed Emotion Index

The mother-child emotional relationship and the mother´s overprotective attitudes towards the child were rated using the Expressed Emotion (EE) index both in Study 1 and in Study 2. EE is an index of significant others' attitudes, beliefs and feelings toward an identified member of the family (Fogler et al. 2007) It has successfully being applied in research on anxiety in childhood (Hirshfeld & Bierderman, 1997; McCarty & Weisz, 2002). Interestingly parental beliefs and attitudes towards the child have gained interest when looking at the influences of parenting on the child's adjustment (Kortlander, et al. 1997; Rubin & Mills 1999; review by Bögels & Brechman-Toussaint, 2006)

EE was assessed with the brief Five Minute Speech Sample (FMSS- Magana, Goldstein, Karno, Miklowitz & Falloon, 1986). The FMSS has proven to be psychometrically valid to assess EE (Magana et al. 1986). In the FMSS the main caregiver is asked to talk about their child for five minutes. The FMSS was administered over the phone as it has been

proven to be as reliable and valid as when administered face to face (Beck, Daley, Hastings & Stevenson, 2004). The different variables measured are shown in Table 4.

Table 4

Description and Scoring of the Variables in the EE index

Variable	Description	Scoring
Initial Statement	The first thought expressed about the child.	It is rated negative if any of these are present: (1) a strong critical tone; (2) a negative description; (3) a negative relationship. It is rated positive or neutral otherwise.
The mother-child relationship	Describes how the parent and the child get along together.	It is rated negative if any of these conditions are present: (1) a direct statement that the parent and the child do not get along well; (2) inability to communicate. It is rated positive or neutral otherwise.
Criticisms	Negative comments about the child's behaviour and/or personality.	They are identified on the basis of: (1) critical content; (2) critical tone. A frequency count is carried out.
Dissatisfaction	Describes the child's unfavourable behaviours, or personality traits not compelling to be a criticism.	It is rated present or absent. A value of 1 or 0 is assigned respectively.
Emotional display	The parent cries or is unable to speak during the interview due to emotional sentiment.	A value of 0 is assigned when absent. A value of 1 is assigned when present.

Variable	Description	Scoring
Self-sacrificing/Overprotective behaviours	(1)The respondent reports that they have sacrificed themselves in an extreme and/or unusual manner for the relative; (2) there is no enjoyment in the self-sacrificing behaviours;(3) the behaviours indicate extreme overprotection.	It is rated present when any of the three descriptive characteristics is found. A value of 1 is assigned when present. A value of 0 is assigned when absent.
Excessive detail about the past	The parent gives a lot of extra information about the child's distant past.	A value of 0 is assigned when absent. A value of 1 is assigned when present.
Statement of Attitude	The parent expresses very strong feelings of love for the child or willingness to do anything for the child.	A value of 0 is assigned when absent. A value of 1 is assigned when present.
Positive Comments	A positive comment is one in which the child's behaviour or personality is praised.	A frequency count is carried out.
Warmth	Defined as the intensity of sentiment that parents express about their child.	When scoring it, (1) the tone of voice; (2) the spontaneity; (3) the concern/empathy shown by the parent is considered.

The main caregiver is assigned a high-EE score when he/she is highly critical, highly over involved, or both. A highly critical rating is given if any of the following: (1) negative initial statement; (2) negative relationship (3); one or more criticisms. A highly emotional over involved (EOI) rating is given if any of the following: (1) self-sacrificing behaviours (2) emotional display during the interview (3) any two of the following: (3.1) excessive detail about the past (3.2) one or more statements of attitude (3.3.) five or more positive comments. A borderline EOI rating is given when there is no evidence for self-sacrificing/overprotective behaviours or emotional display and there is evidence for: one or more statements of attitude; excess detail · about the past; or five or more positive comments. Low-EE is assigned when none of the ratings above apply.

For the purpose of this PhD study, the mother –child emotional relationship in the highly critical rating was looked at. In addition evidence for a high or borderline emotional over involvement (EOI) rating was looked for. Parental over involvement has been identified as a a sub dimension of parental overprotection (see review by McLeod et al. 2007).

3.3.6.1 Variability and Reliability of the EE index

The variability in the FMSS rating scores was very low. No mothers were rated as showing high EOI or high critical rating. However 51 mothers were rated with a borderline EOI, because they expressed five or more positive comments about their offspring, see Table 5.

A total of 110 samples were coded by a fully trained rater blind to the offspring's levels of separation anxiety. To assess inter-rater reliability 10 of these samples were recoded by another fully trained rater also blind to the offspring's anxious symptomatology. For the mother-child emotional relationship the inter-rater reliability was satisfactory (K = .78). For the borderline EOI rating the Cohen's Kappa was 1.0, indicating total inter-rater agreement.

Table 5

Frequencies and percentages of the mother-child emotional relationship and of EOI variables.

EE Variables (N = 110)	
1. Mother-Child Relationship	
Positive	48(43.6%)
Negative-Neutral	62(56.4%)
2. EOI variables:	
2.1 Positive comments:	
Four or less positive comments	59 (53.6%)
Five or more positive comments	51(46.4%)
2.2 Self-sacrificing behaviour	0
2.3 Emotional Display	1 (0.9%)
2.4 Excessive detail about the past	2 (1.81%)
2.5 Statements of attitude	5 (4.54%)

3.3.7 Parenting

The Parenting Styles and Dimensions Questionnaire- (PSDQ) (Robinson, Mandleco, Olsen & Hart, 2001) provided general information about maternal self-reported authoritarian and authoritative styles and reported parenting styles about the partner. It was administered in Study 1. In Study 2 the family factors influencing the child´s anxiety were narrowed down so emphasis was made on maternal mental health and on the EE index.

The PSDQ is a shorter version of the 62 item PSDQ (Robinson, Mandleco, Olsen & Hart, 1995). It consists of 32 items. For each item the respondent is asked to rate how often he/she exhibits a specific behaviour with the child and how often his/her spouse do so in a 5 point-Likert scale. The items fall into three scales: authoritarian, authoritative and permissive.

The authoritarian and authoritative scales have been found to have an internal consistency of above .80. The permissive scale has been found to have less internal consistency (.64) (Robinson et al. 2001). Therefore for the PhD study it was not used The authoritative scale yields a subscale for warmth and involvement. The authoritarian scale yields a subscale for verbal hostility. The permissive scale yields a subscale for lack of follow through. The PSDQ has been praised as one of the few instruments available with psychometrically defensible scales relating to childrearing practices (Locke & Prinz, 2002).

The STAI, BDI-II, BAI, PSDQ and RCADS-P are included in Appendix B.

3.4 Description of the Samples

In this section a description of the samples of Study 1 and of Study 2 is given. A description of the sample created by combining the data set from both studies is also given.

3.4.1 Sample: Study 1

The original sample consisted of 77 children and their parents. Due to the fact that only three cases in our study had information about the father as the principal main caregiver of the child and all the rest had information about the mother, the three cases that related to the fathers were deleted. Two other cases were deleted from the final analysis because they were referred cases. Finally the siblings were not included in the final analysis. I chose children nested within the family. I chose one of the children aged 7-14 years at random. A total of 71 non-referred children and their mothers were included in the final study. Age range 6.3 -13.9 years (mean age: 9.9 years; 34 male and 37 female). Forty of the children were 10 or less than 10 years old and 31 were more than 10 years old. Table 6, provides a summary of the demographic variables available on the children.

Table 6

Demographic variables of the children

	Mean (*SD*)	*N*
Chronological age: Months	119.57 (28.76)	71
IQ	96.54 (14.08)	68
Gender	34 male (47.9%)	71
	37 female (52.1%)	

3.4.1.1 Demographic and clinical characteristics of the sample

3.4.1.1.1 Pre-analyses of the child's mental health variables

Firstly the levels of anxiety and depression in the child were examined in our sample to see whether they fell within the normal range. The normative data for the STAIC is based on two large samples of elementary school children (M = 37.35; SD = 6.5). The normative data for the RCADS is based on a large sample of children aged 8 to 13 years. For the RCADS total trait scale the mean is of 33.74 and the SD of 14.68. For the RCADS social phobia scale the mean is of 11.44 and the SD of 4.85. For the RCADS separation anxiety scale the mean is of 3.49 and the SD of 2.96. Finally for the RCADS depression scale the mean is of 7.72 and the SD of 4.02. As shown in Table 7, the mean trait, separation/social anxiety and depression in our sample was within the normative data. Independent *t*- test showed that males and females had no mean differences in their trait, separation/social anxiety or depression levels as reported by their parents. The only sex difference found was in the self-report of social anxiety ($t(67)$ = -2.5, $p < .05$, r = .29) and in the self-report of trait anxiety as measured by the RCADS ($t(67)$ = -2.6 $p < .01$, r = .30). In both cases girls reported higher anxiety levels than boys.

Table 7

Means and SD for the children's trait anxiety, social/separation anxiety and depression measures as reported by themselves and by their mothers

	Children's Report		Mothers' Report	
	Mean (*SD*)	*N*	Mean (*SD*)	*N*
RCADS social phobia	8.65 (5.74)	69	8.18 (4.29)	50
RCADS total trait anxiety	30.40 (19.78)	69	19.20 (12.19)	50
RCADS separation anxiety	4.8 (4.21)	69	4 (3.42)	50
RCADS depression	7.26 (5.11)	69	4.08 (4.17)	50
STAIC trait anxiety subscale	35.80 (7.85)	71	Only data available for children's report	

To explore the levels of agreement between the child's and the mother's report of anxiety a correlation analysis was conducted. The correlations were carried out separately for the older and younger children because difficulties in reporting their own emotions have been highlighted in younger children (Aldridge & Wood 1997; Roth, Dadds & McAloon, 2004). For the younger children, it was found that only mother's report of the child's total anxiety significantly correlated with the child's self-report of total anxiety (*r* = .41, *p* < .05). See Table G1 in Appendix G. For the older children it was found that maternal reports of the child's trait anxiety, social/separation anxiety and depression were highly correlated with the child's self-report on each of these variables. All the correlations found were significant at a *p* value of less than 0.01 and with an *r* value of more than 0.50. See Table G2 in Appendix G. Consistent with the literature these results suggest that older children might be more attuned to their emotions and more accurate in self-reports than younger children. It could also be suggested that mothers would not be good at understanding their young offspring emotional experiences. However it has been found that mothers can

accurately predict 3 to 9 year olds internal emotional experience (Casey & Fuller, 1994).

3.4.1.1.2 Pre-analyses of demographic and mental health variables in younger children

Several *t*-tests showed no significant differences in mean IQ for younger children scoring above the mean in separation or total trait anxious symptomatology compared to those scoring below the mean. Only the mean IQ for younger children scoring above the mean in social anxiety compared to those scoring below the mean was found to be statistically significant $t(23) = -2.0$ $p < .05$, $r = .38$. It was found that low socially anxious children had lower IQ scores ($M = 93$, $SD = 14.77$) compared to high socially anxious children ($M = 105$, $SD = 16.11$). This finding could be explained by the argument that anxiety over intellectual performance is an antecedent of a cognitive reflective disposition. With this cognitive disposition the subject would commit less mistakes and his/her accuracy would be higher when performing intellectual tasks (Messer 1970). Interestingly social anxiety has been linked to self-consciousness and reflective cognitive processes (Hofmann, Heinrichs & Moscovitch, 2004). No difference in mean IQ was found for children scoring high vs. children scoring low for a depressive symptomatology. See Table 8 for the descriptive statistics of the demographic and mental health variables.

3.4.1.1.3 Pre-analyses of demographic and mental health variables in older children

Several *t*- tests showed no significant differences in mean IQ for older children scoring above the mean in the mental health variables compared to those scoring below the mean. See table below for the descriptive statistics of the demographic and mental health variables.

Table 8

Means and SD for IQ and mental health variables for younger and older children

	Younger children (aged 10 years or under)			Older children (aged over 10 years)				
	Mean	SD	N	Mean	SD	N	*t*	*p*
Chronological age	101.44	12.76	60	146.76	13.26	69	-19.74**	*p* < .01
IQ	96.02	15.59	60	97.25	12.00	69	-0.35	*p* =. 72
RCADS child's report of separation anxiety	49.22	11.31	44	53.96	13.28	54	-1.87	*p* = .06
RCADS child's report of social anxiety	45.37	11.64	44	46.75	8.90	54	-.66	*p* = .50
RCADS child's report of total trait anxiety	45.85	12.25	44	49.71	10.58	54	-1.67	*p* = .09
STAIC self-report trait anxiety	36.07	8.50	40	35.45	7.06	31	0.32	*p* = .74
RCADS child's report of depression	46.63	10.05	44	50.20	12.22	54	-1.55	*p* = .12
RCADS parent's report of separation anxiety	49.39	9.96	41	51.02	9.77	52	-.88	*p* = .41
RCADS parent's report of social anxiety	44.57	8.57	41	46.23	9.47	52	-.87	*p* = .38
RCADS parent's report of total trait anxiety	40.98	8.28	41	43.33	9.51	52	-1.25	*p* = .21
RCADS parent's report of depression	39.06	7.69	41	44.69	10.98	52	-2.79**	*p* <.01

As presented in the previous table young and old children did not significantly differ in their levels of separation, social or trait anxiety. A t-test however showed significant mean differences in their levels of depression as reported by the mother. Older children (M = 44.69, SD = 10.98) were significantly more depressed than younger children (M = 39.06, SD = 7.69). This finding is consistent with the literature, as there is developmental research that shows that anxiety can precede depression (Burke et al. 2005; Flannery-Schroeder, 2006).

3.4.1.1.4 Pre-analyses of maternal mental health variables

The levels of maternal trait anxiety and depression were also examined. Mothers in the present study reported mean trait anxiety scores that fell within the STAI normal range (mean: 35-40). Their levels of depression were minimal according to the BDI-II manual (Beck et al. 1996). See Table 9.

Table 9

Means and SD for the mother's levels of trait anxiety and depression

	Mean (SD)	N
STAI, mother's level of trait anxiety	38.48 (11.52)	50
BDI-II, mother's depression	8.8 (9.8)	49

3.4.2 Sample: Study 2

The sample consisted of 60 non-referred children and their mothers. To increase the range of maternal panic anxiety and depression, 30 offspring were selected as having high-risk mothers. In order to ensure that this sampling criteria was met, 30 of the offspring had mothers whose depression scores were 12/13 and above in the revised Beck's Depression Inventory (BDI-II). This cut off has been found adequate to screen for depressive symptoms in a community sample (Lasa et al. 2000). It was also

ensured that maternal levels of panic anxiety were above the normal range. This criterion was met taking into account maternal scores on the Beck's Anxiety Inventory (BAI) and the Albany Panic and Phobia Questionnaire (APPQ). Finding overall high scores of maternal panic anxiety in one of the instruments was deemed sufficient to meet the criterion.

The age range of the children was 7-14.5 (mean age: 10.5, SD = 1.83; 29 male and 31 female). Thirty of the children were aged 10 years or under and 30 of the children were aged over 10 years.

3.4.2.1 Demographic and clinical characteristics of the sample

3.4.2.1.1 Pre-analyses of the child's mental health variables

The levels of separation, social, total trait anxiety and depression in the child (as measured by the RCADS) were examined to establish if they fell within the normal range. The normative data for the RCADS was drawn from a large sample of children aged 8 to 13. For the RCADS separation anxiety scale the mean is of 3.49 and the SD of 2.96. For the RCADS social phobia scale the mean is of 11.44 and the SD of 4.85. For the the RCADS total trait scale the mean is of 33.74 and the SD of 14.68. Finally for the RCADS depression scale the mean is of 7.72 and the SD of 4.02. As shown in Table 10, the mean total trait, separation/social anxiety and depression in our sample was within the normal range. Independent t- test showed that males and females had no mean differences in their total trait, separation/social anxiety or depression levels as reported by their parents or by themselves.

Table 10

Means and SD for the children's total trait anxiety, social/separation anxiety and depression measures as reported by themselves and by their mothers

	Children's Report	Mothers' Report
	Mean (*SD*)	Mean (*SD*)
RCADS social phobia	8.75 (4.14)	9.63 (4.41)
RCADS total trait anxiety	29.38(15.10)	23.68 (11.88)
RCADS separation anxiety	4.9 (4.00)	4.28 (2.81)
RCADS depression	6.61 (3.57)	4.83 (3.80)

The levels of agreement between the child's and the mother's report of anxiety and depression were examined. Correlations were carried out separately for the younger and older group of children. For the younger group of children, the child's self-reported separation, social, total trait anxiety or depression were found not to correlate with the mother's report of the child's separation, social, total trait anxiety or depression. This finding is consistent with the demographic characteristics of the sample in Study 1. In contrast for the older group of children it was found that the child's self-reported separation anxiety significantly correlated with the mother's report of the child's separation anxiety (r = .41, p < .05). The child's self-reported social anxiety was also significantly correlated with the mother's report of the child's social anxiety (r = .42, p < .05). Finally the child's self-reported total trait anxiety significantly correlated with the mother's report of the child's total trait anxiety (r = .39, p < .05). See Table G3 in Appendix G.

For offspring of mothers high in panic anxiety and for offspring of mothers low in panic anxiety (as measured with the APPQ) means and *SD* of the child anxiety measures were calculated. See Table 11. The BAI was not employed in this analysis as maternal panic-like symptoms measured with the BAI were in the normal range (see next section). The fact that the BAI showed no elevation in maternal panic anxiety could be explained by a

poor validity of the BAI in non-clinical samples. Research suggests that the construct validity of the BAI may be diminished in these samples (Creamer, Foran & Bell, 1995). The authors found that the two factor structure of the BAI (characterised by physical and cognitive symptoms) could not be distinguished in undergraduate students in the absence of a stressor. Further studies exploring the psychometric properties of the BAI in a non-referred population are needed.

Table 11

Means and SD of the child anxiety measures for offspring of mother with panic anxiety and for offspring of mother without panic anxiety

	Offspring of mother with panic anxiety (N= 27)		Offspring of mother without panic anxiety (N=33)			
	Mean	SD	Mean	SD	t	p
RCADS child's report separation anxiety	5.62	4.74	4.44	3.41	-0.72	p = .47
RCADS child's report social anxiety	9.37	5.02	8.69	4.04	-0.28	p = .77
RCADS child's report total trait anxiety	32.58	17.50	27.25	13.09	-0.88	p = .37
RCADS mother's report separation anxiety	4.87	3.15	4.22	3.33	-0.15	p = .87
RCADS mother's report social anxiety	10.41	5.46	9.47	4.13	-0.38	p = .70
RCADS mother's report total trait anxiety	28.04	14.68	21.86	11.15	-1.25	p = .21

The means in anxious symptoms for the child were higher for offspring of mother with panic anxiety compared to offspring of mother without panic anxiety. However several *t*-tests showed that the mean differences were not significant.

3.4.2.1.2 Pre-analyses of maternal mental health variables

Whether the levels of maternal panic/phobic anxiety fell within the normal range were also examined. Because half of the sample were high-risk mothers with symptoms of depression and/or panic anxiety, it was expected that the levels of maternal phobic anxiety would be above the normal range. The manual for the BAI reports the following means for individuals with anxiety disorders (AD): PD with agoraphobia, 27.27 (SD = 13.11); PD without agoraphobia, 28.81 (SD = 13.46); social phobia, 17.77 (SD = 11.64); OCD, 21.96 (SD = 12.42); and GAD, 18.83 (SD = 9.08) (Beck et al. 1988). In a normative community sample matched to the U.S. national consensus, a score of 3 fell at the 50th percentile and a score of 10 fell at the 80th percentile (Gillis, Haaga & Ford, 1995). The manual for the APPQ reports the following means in a study of outpatients with PD and moderate to severe agoraphobia: for the agoraphobia subscale, 12.8 (SD = 9.8) for the social phobia subscale, 13.1 (SD = 9.7), for the interoceptive subscale, 9.6 (SD = 9.2) (Rapee et al. 1994). As shown in Table 12 and consistent with what would be expected, the levels of maternal panic anxiety assessed with the interoceptive subscale of the APPQ fell above the normal range. Although the mean of panic anxiety assessed with the BAI did not reach the means of individuals with AD, it was close to the 80th percentile of a community sample (Gillis et al. 1995). Moreover the levels of maternal phobic anxiety assessed with the agoraphobia and social phobia of the APPQ fell above the normal range.

Table 12

Means and SD for the mother's levels of panic, phobic anxiety and depression

	Mean *(SD)*	*N*
BAI	8.81 (7.40)	60
APPQ interoceptive subscale	10.06 (7.94)	60
APPQ agoraphobia subscale	16.05(8.63)	60
APPQ social phobia subscale	20.20(11.72)	60
BDI-II, mother's depression	12.26 (10)	60

3.4.3 Calculation of Power for Samples in Study 1 and 2

In previous studies investigating cognitive biases, family factors and childhood anxiety a medium effect size has been observed (Costa & Weems, 2005; McLeod, Wood & Weisz, 2007). Therefore the number of participants required was calculated with G*Power for an expected medium effect size at a power of 0.80. An enlarged data set that included participants from Study 1 and Study 2 was created to achieve a maximum power in the analyses.The Power for each of the analyses conducted is speficied in the results section.

3.4.4 Combined Sample

The sample consisted of 129 non-referred children and their mothers (participants from Study 1 and from Study 2). Two cases from Study 1 were not included in this sample because in these cases there was missing data in both the maternal and the child's anxiety variables. The age range of the children was 6.3-14.58 years (mean age: 9.9 years;

SD = 26.12) and there were 62 males and 67 females. Sixty-nine children were aged 10 years or under (mean age: 8.45; *SD* = 12.76) and 60 children were aged over 10 years (mean age: 12.23; *SD* = 13.26). See Table 13, for a summary of the demographic variables of the children.

Table 13

Demographic variables of the children

	Mean (*SD*)	*N*
Chronological age: Months	122.57 (26.12)	129
Gender	62 male (48.1%)	129
	67 female (51.9%)	

3.4.4.1 Demographic and clinical characteristics of the sample

3.4.4.1.1 Pre-analyses of the child's mental health variables

In this section it is aimed to give a descriptive analysis of the child's levels of separation, social and trait anxiety. It is aimed to explore whether these anxiety levels fall within the normal range.

In Table 14 means and *SD* for the children's separation, social and trait anxiety measures as reported by themselves and by their mothers are presented. Of the 129 participants, 98 participants had a complete data set in self-reports for T scores (54 of them were aged 10 or above, 44 of them were aged under 10). Ninety-three had a complete data set in maternal reports for T scores (52 of them were aged 10 or above; 41 of them were aged under 10). T scores were employed to give a better notion of where the score stood in reference to the normative sample. As mentioned previously T scores of 65 or higher are at the borderline clinical threshold.

Table 14

Means and SD for the children's self-reported and maternal reported separation, social and trait anxiety

	Children's self-reported anxiety (N = 98)				Maternal reported anxiety (N = 93)			
	Raw Score		T Score		Raw Score		T Score	
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Separation anxiety	4.86	4.06	51.83	12.60	4.15	2.96	50.28	9.84
Social anxiety	8.44	4.59	46.13	10.19	8.80	4.04	45.50	9.07
Total trait anxiety	29.49	16.92	47.98	11.46	20.99	10.35	42.30	9.02

Based on the normative data of the RCADS, separation, social and total trait anxiety (both as reported by the mother and the child) fell within the normal range. The normative data of the RCADS is as follows: the mean of the total trait anxiety scale is 33.74 and the *SD* 14.68, the mean of the social phobia scale is 11.44 and the *SD* 4.85. Finally the mean for the separation anxiety scale is 3.49 and the *SD* 2.96. T scores of 65 or higher are at the borderline clinical threshold.

Independent t –test showed that for males and females there were no mean differences of self-reported separation ($t(96) = .42$, $p = .67$) social ($t(96) = -.40$, $p = .68$) and trait anxiety ($t(96) = .02$, $p = .98$). In addition mean differences were not significant for maternal reports of separation ($t(91) = .79$, $p = .42$) social ($t(91) = -.21$, $p = .82$) or trait anxiety ($t(91) = .27$, $p = .78$).

Levels of agreement between self-reported and maternal reported anxiety measures were examined with a correlation analysis. Following the same procedure as in Study 1 and in Study 2, this correlation analysis was carried out separately for the younger and the older group of children. For the younger group of children it was found that self-reported separation and trait anxiety were significantly correlated with maternal-reported separation ($r = .31$, $p < .05$) and trait anxiety ($r = .30$, $p < .05$) respectively. The effect size of the correlation was however moderate. See Table G4 in Appendix G. These result replicate the low levels of agreement found between maternal and child reports for the young group of children in Study 1 and 2. In addition these result corroborate empirical work (Aldridge & Wood, 1997; Roth et al. 2004). For the older group of children it was found a high agreement between the mother's and the child's report of separation, social and total trait anxiety. These results also replicate those found in Study 1 and 2. See Table G5 in Appendix G. Reports of depression in the child showed a similar pattern as the one observed for anxiety. For the younger group of children no associations were found between maternal and child reports of depression. For the older group of children a significant association was found between maternal and child reports of depression. The effect size of the association was medium ($r = .45$, $p < .01$).

3.4.4.1.2 Pre-analyses of older and younger children mental health variables

To explore whether the levels of separation, social and trait anxiety differed for the older and younger group of children a *t* –test was conducted. Mean differences were observed for self-reported separation anxiety for the older and younger group of children. For the younger group of children mean scores of self-reported separation anxiety were M = 49.22, SE = 1.70 whereas for the older group of children mean scores were M = 53.96, SE = 1.80. The *t*-test approached significance $t(96)$ = -1.87, p = .06. This finding is not in line with the developmental course of separation anxiety, as symptoms of separation anxiety typically decrease with age (Bell-Dolan et. al., 1990; Costello et al. 2003).

3.4.4.1.3 Pre-analyses of the maternal childrearing and mental health variables

Firstly maternal levels of depression were explored to see whether they fell within the normal range. The range of the levels of depression in the mother was 0 to 43 (M = 10.24, SD = 9.18). The BDI-II Beck's manual (Beck et al. 1996) considers that a score of 13 or above is indicative of a depressive symptomatology. A score in the BDI-II of 12/13 and above has been established as a cut off point that indicates that a non-referred individual is suffering from a depressive symptomatology (Lasa et al. 2000). Thus the depression scores in the sample fell within the normal range. Frequencies and percentages of the EE variables included in the study are shown in the previously presented Table 5. As mentioned earlier the variability in the EE categories was low.

CHAPTER 4

Attention and Interpretive biases in Childhood anxiety

4.1 Introduction

ABs have been found to contribute to high trait anxiety even in non-referred children (Taghavi et al. 2000). Non-referred socially anxious children have also been found to exhibit an AB away from faces depicting anger, sadness, fear or disgust (Stirling et al. 2006). This last finding is in line with adult cognitive models of social phobia (Clark & Wells, 1995). Interpretive biases have been found to play a role both in non-referred high trait and socially anxious children (Muris, Luermans et al. 2000; Muris, Merckelbach et al. 2000; Dineen &Hadwin, 2004).

Despite the advances made in cognitive theories on childhood anxiety, further research is still merited. For example there is a need for examining cognitive biases from a developmental perspective (Hadwin, Garner & Perez-Olivas, 2006). A fruitful line of research is to ascertain whether young children (aged under 10 years) would show a general threat-related AB independently of their anxiety levels, and if it is only when children grow older and fail to inhibit their attention to threat that they can develop an anxious symptomatology (Kindt et al. 2003). As in the literature on ABs, more work is needed on the developmental course of threat-related interpretive biases. It has been recently demonstrated that children's lack of attentional control skills is linked to anxious interpretations of ambiguous social vignettes (Muris, Meesters & Rompelberg, 2007). There is also a need to examine the sensitivity of different methodologies adapted from adult research in capturing processing biases in children. For example although the dot probe task has been successful in assessing threat-related ABs in adults some inconsistencies have been found when using this task with children (Ehrenreich & Gross, 2002).

The aim of this chapter is to explore the first hypothesis of the thesis on processing biases in childhood anxiety. Findings on anxious-related ABs

assessed with the VST and the MDPT are presented first. Due to the high co-ocurrence of depression and anxiety it is examined whether threat-related ABs are specific to anxiety and not to depression (Mogg et al. 1993; Bradley et al. 1995; Dalgleish et al. 2003).

Secondly findings on anxious-related interpretive biases assessed with a story task are presented. The chapter concludes with a summary of the main findings and future research directions.

4.2 A threat-related AB towards faces with the VST

4.2.0 Introduction

Based on recent empirical work it was hypothesised that an AB towards and/or away from threat-related facial expressions would be associated with social and separation anxiety in children (Pine, Klein et al. 2005; Stirling et al. 2006). In addition this threat-related AB would be specific to anxiety and not to depression (Mogg et al. 1993; Bradley et al. 1995). Angry facial expressions were an index of threat (Mogg et al. 2000; Monk et al. 2006.) Neutral facial expressions were also examined as having a potentially threatening value based on Cooney's et al. (2006) findings. The authors found that socially anxious individuals appeared to be interpreting neutral facial stimuli in a threatening manner.

The combined sample was employed to examine this first hypothesis as the VST had been used both in Study 1 and in Study 2. A total of 98 participants had complete data sets for T scores. A series of linear regression analyses were carried out. Mutilple regression analyses were carried out to explore the role of the child's depression in threat-related ABs and to explore the moderating effects of age on the relationship between ABs and anxiety in the child.

Angry present slopes was the variable looked at. As mentioned in Chapter 3 angry present slopes were an indicator of enhancement or

avoidance of the stimuli (Rinck et al. 2003). On the other hand the target absent condition indicated general search strategies in children (Chun & Wolfe, 1996).

4.2.1 Calculation of Power

The power of the statistical tests was calculated at an expected medium effect size. For linear regression analyses a sample size of 98 child reports lend a power of .96; and a sample size of 93 maternal reports lend a power of .95. For multiple regression analyses with two predictors a sample size of 98 and 93 lend a power of .93 and .91 respectively. For multiple regression analyses with three predictors a sample size of 98 and 93 lend a power of .89 and .88 respectively.

When the data set was split into two groups: older and younger children, linear regression analyses lend a power of .79 for the older group of children (N = 54) and of .70 for the younger group of children (N = 44). Multiple regression analyses with two predictors lend a power of .69 for the older group of children and of .59 for the younger group of children. The independent sample t-test conducted to compare the levels of separation anxiety for the older and younger children lend a power of .68.

4.2.2 Results:Threat-related ABs in Children with Separation Anxiety

A linear regression analysis showed little evidence to support that angry present slopes could predict a child's separation anxiety as reported by the mother (B = -.09, p = .35). When maternal depression was controlled for due to possible reporting bias little evidence for a relationship between angry slopes and maternal reports of separation anxiety in the child was found (B = -.14, p = .35). See Table 15

Table 15

Summary of Hierarchical Regression Analysis for Angry Present Slopes Predicting Maternal Reports of Separation Anxiety (N= 93). Maternal Depression is controlled for.

Variable	B	SE B	β
Step 1			
Maternal Depression	0.29	0.10	.28**
Step 2			
Maternal Depression	0.30	0.10	.29**
Angry Present Slopes	-0.02	0.01	-.14

Note. R^2 = .08 for Step 1; ΔR^2 = .02** for Step 2 (p**< .01).

A linear regression analysis showed however a trend in the data to support a negative association between angry present slopes and self-report separation anxiety in the child (B = -.18, p = .06). This association indicated that as anxiety increased the gradient of the angry slopes was flatter. Further analyses examined whether chronological age (CA) could be moderating the relationship between angry present slopes and self-report separation anxiety in the child. The values in the CA and angry present slopes variables were centred and the CA*angry present slopes interaction term computed. A regression analysis showed that the CA*angry present slopes interaction term approached significance (B = -.19 p = .06) when predicting self-reported separation anxiety in the child; highlighting that attentional biases to angry faces are subject to age-related effects. See Table 16

Table 16

Multiple Regression Analysis for the Interaction Term Chronological Age (CA) X Angry Present Slopes predicting Self-Reported Separation Anxiety (N= 98)

Variable	B	SE B	β
CA centred	0.03	0.06	.05
Angry present slopes centred	-0.03	0.02	-.15
Interaction term CA X angry present slopes	-0.00	0.00	-.19

Following developmental theoretical frameworks and empirical work, attentional biases to angry faces were therefore examined separately in two age groups: children aged over 10 years and children aged 10 years or below (Kindt & van den Hout, 2001; Lonigan et al. 2004; Kindt et al. 1997). A *t*-test showed no significant differences in the levels of maternal ($t(91) = -.82$, $p = .41$) or self-reported separation anxiety ($t(96) = -1.87$, $p = .06$) for both age groups, although the mean differences for self-reported separation anxiety approached significance. Mean scores for self-reported separation anxiety were higher in the older group of children ($M = 53.96$, $SE = 1.80$) than in the younger group of children ($M = 49.22$, $SE = 1.70$).

4.2.2.1 ABs to angry faces in the younger group of children

A linear regression analysis showed that angry present slopes did not predict the levels of self-reported separation anxiety ($B= -.002$, $p = .98$).

4.2.2.2 ABs to angry faces in the older group of children

With a linear regression analysis angry present slopes were found to predict the levels of self-reported separation anxiety in the child ($B = -.27$, $p < .05$); the negative sign of the beta value indicates that children who

reported having high levels of separation anxiety took less time to detect the presence of an angry face. To explore whether anxious children had an altered search strategy that would account for the threat-related AB found, an additional linear regression looking at angry absent slopes was conducted. Angry absent slopes were not found predictive of self-reported separation anxiety in the child (B = -.04, p = .74). This result indicates that no shallow slopes emerged when children high in separation anxiety were searching for an angry face that was not there. Therefore children with separation anxiety did not show an altered gaze behaviour tendency as they were searching serially through the angry distractors that had a likelihood of being a target.

4.2.2.3 Interim conclusion

These findings are in line with developmental theories on the emergence of ABs. It was found that for older children angry present slopes predicted an increase in the levels of self-reported separation anxiety.

Mothers have been found accurate in reporting their children's depression (Puura, et al. 1998) and anxiety symptoms (Kendall, et al. 2007). However a feasible explanation of why no association was found between maternal reports of separation anxiety and angry present slopes could be related to the low levels of separation anxiety (reported by the mother). Indeed in a further analysis it was found that the levels of separation anxiety reported by the child (M = 54.33, SE = 1.82) were higher compared to the levels of separation anxiety reported by the mother (M = 51.33, SE = 1.36). A paired sample t-test showed that this difference approached significance ($t(52)$ = 1.86, p = .06, r = .25)

To further explore the argument that no threat-related ABs emerged with maternal report of separation anxiety due to the low levels of the child's anxiety reported by the mother, it was examined whether ABs towards threat would emerge as a predictor with higher levels of separation anxiety

reported by the mother. In order to do so a linear and a quadratic regression equation were explored with a hierarchical regression analysis. In the first step of the analysis the predicted values for a linear regression equation were entered. In the second step of the analysis the predicted values for a quadratic regression equation were entered. It was found that the predicted values for a quadratic regression equation explained an additional 9% of the variance of maternal report of separation anxiety scores. The p value for R square change was significant ($p < .05$). These results indicate that ABs towards threat would predict higher levels of maternal report of separation anxiety in the child. They also indicate that ABs away from threat would predict higher levels of maternal report of separation anxiety in the child. See Figure below.
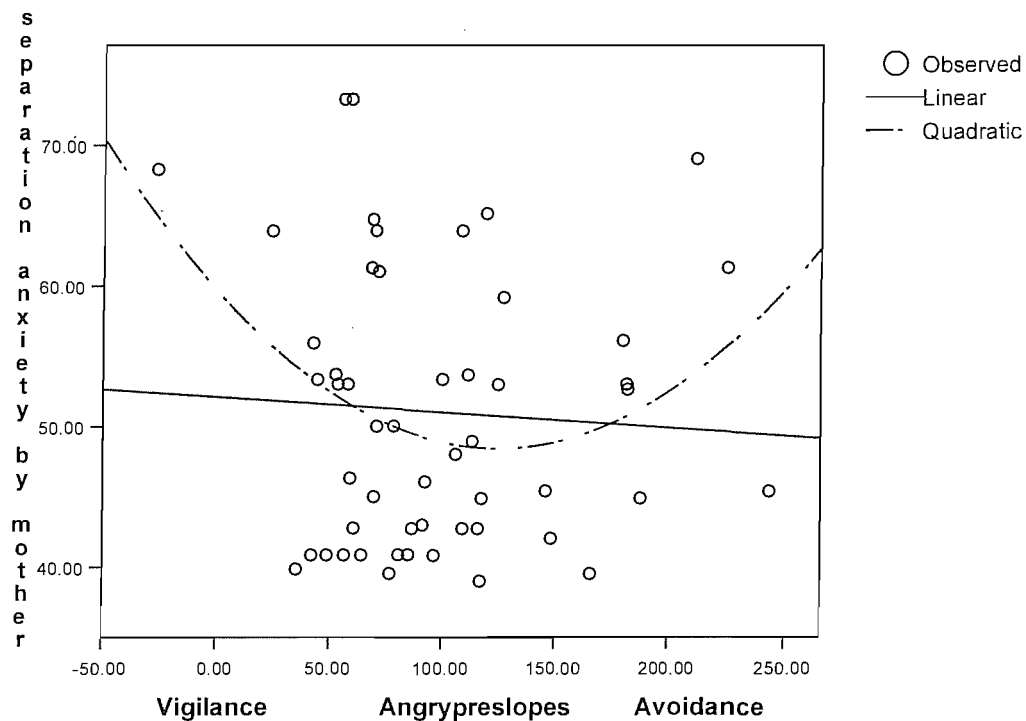
Figure 9. Graph showing the curvilinear and linear relationship between angry present slopes and maternal report of separation anxiety in the child. In the X axis, the higher the RTs for angry present slopes the higher the avoidance of threat.

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Several research gives evidence for a vigilance-avoidance effect in which ABs towards and away from threat would be observed. It has been shown vigilance for threatening faces both with a VST and a DPT (Gilboa-Schechtman, Foa & Amir, 1999; Mogg & Bradley,1998; Bradley, Mogg & Millar, 2000). On the other hand studies examining social phobia in adults have also demonstrated an AB away from threatening faces (Chen, Ehlers, Clark & Mansell, 2002). In addition empirical work shows that the nature of ABs can vary as a function of the time course in the processing of emotional pictures (Calvo & Avero 2005). The authors showed that high trait anxious individuals exhibited selective attention towards emotional scenes during the first 500ms following onset of the scenes, but an attention away from them during the last 1000ms of picture exposure.

4.2.2.4 Is this AB constrained to angry faces?

A linear regression analysis was carried out in which the predictive value of neutral present slopes for self-report separation anxiety in the child was examined. No significant effects were found, although there was a trend in the data suggesting that neutral present slopes could predict self-report separation anxiety ($B = -.23$, $p = .09$). The negative sign of the Beta value indicates that high separation anxious children would take less time to detect the presence of a neutral face.

A possible link between neutral present slopes and maternal reports of separation anxiety was also looked at. In line with the previous findings on angry slopes, neutral slopes was not found to predict maternal reported separation anxiety. Even when maternal depression was controlled for to counteract reporting biases no significant results were found. Maternal depression was first entered in a hierarchical regression analysis and neutral present slopes were entered in the second step of the model. Neutral present slopes did not predict separation anxiety in the child as reported by the mother ($B = -.17$, $p = .21$). See Table 17.

Table 17

Summary of Hierarchical Regression Analysis for Neutral Present Slopes Predicting Maternal Reports of Separation Anxiety (N= 93). Maternal Depression is controlled for.

Variable	B	SE B	β
Step 1			
Maternal Depression	0.26	0.14	.24
Step 2			
Maternal Depression	0.27	0.14	.25
Neutral Present Slopes	-0.03	0.02	-.17

Note. R^2 = .06 for Step 1; ΔR^2 = .03 for Step 2

4.2.2.5 Is the AB constrained to potentially threatening facial expressions?

As expected a linear regression analysis showed that happy present slopes were not predictive of self-report separation anxiety in the child (B = -.07, p = .61) neither were predictive of maternal reports of separation anxiety in the child (B = -.05, p = .70). Once more little evidence for a predictive value of happy present slopes over maternal reports of separation anxiety was found even when maternal depression was controlled for in a hierarchical regression analysis (B = -.05, p= .68). See Table 18

Table 18

Summary of Hierarchical Regression Analysis for Happy Present Slopes Predicting Maternal Reports of Separation Anxiety (N= 93). Maternal Depression is controlled for.

Variable	B	SE B	β
Step 1			
Maternal Depression	0.26	0.14	.24
Step 2			
Maternal Depression	0.26	0.14	.24
Happy Present Slopes	-0.01	0.02	-.05

Note. R^2 = .06 for Step 1; ΔR^2 = .00 for Step 2

4.2.2.6 Are threat-related ABs specific to anxiety and not to depression?

Depression in the child (as reported by him/herself and as reported by the mother) was controlled for in two separate regression analyses.

Firstly it was examined whether angry present slopes would be predictive of a child's self-reported separation anxiety even when controlling for the child's self-reported depression. The child's self-reported depression was included in the first step of a hierarchical regression analysis. In the second step of the analysis angry present slopes were entered. It was found that angry present slopes predicted the child's self-reported separation anxiety (B = .-30, p < .01) even when controlling for the effects that the child's self-reported depression had on the child's self-reported separation anxiety. After controlling for self-report depression in the child, angry present slopes explained an additional 9% of the variance in separation anxiety scores. It was a statistically significant contribution as shown by the p value for the R square change (.00). See Table 19.

Table 19

Summary of Hierarchical Regression Analysis for Angry Present Slopes Predicting Child Reports of Separation Anxiety after controlling for Child Reports of Depression (N = 54)

Variable	B	SE B	β
Step 1			
Child's self-reported depression	0.62	0.12	.57**
Step 2			
Child's self-reported depression	0.63	0.11	.58**
Angry Present Slopes	-0.07	0.02	-.30**

Note. R^2 = .32 for Step 1; ΔR^2 = .09** for Step 2 (p**< .01).

The second hierarchical regression analysis differed from the previous one in that maternal reports of the child's depression was entered in the first step of the model instead of the child self reports. This analysis showed that when maternal reports of the child's depression was controlled for there was a trend in the data suggestive of the predictive value of angry present slopes over a child's separation anxiety (*B* = -.21, *p* = .08). After controlling for depression in the child as reported by the mother angry present slopes explained an additional 4% of the variance in the child's separation anxiety. This statistical contribution however only approached significance as the *p* value for the R square change (.08) shows. See Table below

Table 20

Summary of Hierarchical Regression Analysis for Angry Present Slopes Predicting Child Reports of Separation Anxiety after controlling for Maternal Reports of Child Depression (N = 54).

Variable	B	SE B	β
Step 1			
Maternal reports of Child's Depression	0.64	0.14	.52**
Step 2			
Maternal reports of Child's Depression	0.59	0.14	.48**
Angry Present Slopes	-0.05	0.03	-.21

Note. R^2 = .27 for Step 1; ΔR^2 = .04 for Step 2 (p**<.01).

4.2.3 Results: Threat-related ABs in Children with Social Anxiety

Angry present slopes as an index of threat-related ABs was first examined. A linear regression analysis found that angry present slopes did not predict social anxiety as reported by the child (B = -.00, p = .97) nor predicted social anxiety as reported by the mother (B = -.09, p = .34). Angry present slopes did not predict social anxiety as reported by the mother even when maternal depression was controlled for to counteract reporting biases. See Table 21

Table 21

Summary of Hierarchical Regression Analysis for Angry Present Slopes Predicting Maternal Reports of Social Anxiety (N= 93). Maternal Depression is controlled for.

Variable	B	SE B	β
Step 1			
Maternal Depression	0.36	0.09	.37**
Step 2			
Maternal Depression	0.37	0.09	.38**
Angry Present Slopes	-0.01	0.01	-.12

Note. R^2 = .14 for Step 1; ΔR^2 = .01 for Step 2 (p**<.01).

As expected because little evidence for a significant relationship between angry present slopes and social anxiety was found, no significant moderating effects of age on this relationship were observed (B = -.00, p = .98).

When the potentially threatening value of neutral present slopes was examined it was found that neutral present slopes did not predict child self reports of social anxiety (B = -.13, p = .17). Consistent with the findings on angry facial stimuli, neutral present slopes were not found to predict maternal reports of social anxiety in the child even when controlling for maternal depression (B = -.09, p = .36). See Table 22.

Table 22

Summary of Hierarchical Regression Analysis for Neutral Present Slopes Predicting Maternal Reports of Social Anxiety (N= 93). Maternal Depression is controlled for.

Variable	B	SE B	β
Step 1			
Maternal Depression	0.36	0.09	.37**
Step 2			
Maternal Depression	0.37	0.09	.38**
Neutral Present Slopes	-0.01	0.01	-.09

Note. R^2 = .14 for Step 1; ΔR^2 = .00 for Step 2 (p**<.01).

Finally happy present slopes were not found predictive of social anxiety as reported by the child (B = -.10, p = .31) or the mother (B = -.08, p = .41) even when maternal depression was controlled for (B = -.12, p = .20).

The fact that the results did not indicate that angry or neutral present slopes would predict social anxiety in the child is opposite to hypothesis 1.

4.3. A threat-related AB towards pictorial stimuli with the MDPT

4.3.0 Introduction

Based on adult research it was hypothesised that high trait anxious children would show an AB towards pictorial stimuli depicting threat (Bradley et al. 1989, Mogg & Bradley 1999).

A Pearson's correlation between the dot probe bias score and maternal and child reports of trait anxiety was carried out at a two-tailed level of significance. As mentioned in Chapter 3, the dot probe bias score was calculated from subtracting the reaction times (RT) in the threat probe off condition (the probe appeared in a different location from the threatening

stimulus) from the RT in the threat probe on condition (the probe appeared in the vicinity of the threatening stimulus). A positive value indicated vigilance for threatening stimuli.

Depression in the child was also entered in the correlation analysis to explore cognitive specificity in threat-related ABs. In addition state anxiety was also included in the correlation analysis to look at the possible interaction effects with trait anxiety. Multiple regression analyses were carried out to explore possible moderating effects of state anxiety and age on the link between trait anxiety in the child and a dot probe bias score.

4.3.1 Calculation of Power

The power of the statistical tests was calculated at an expected medium effect size. For the statistical analyses the sample of Study 1 was used as only for Study 1 there was data available on the MDPT. The sample size of Study 1 was of 71. For Pearson's correlations two-tailed, a sample size of 71 lend a power of .74. For multiple regression analyses with three predictors, a sample size of 71 lend a power of .76.

4.3.2. Results: High trait anxiety in the child and ABs towards threatening pictorial stimuli

No significant correlations were found between the dot probe bias score and maternal or child reports of trait anxiety. However a positive correlation between the dot probe bias score and maternal reports of trait anxiety in the child approached significance ($r = .25$, $p = .07$). (See Table 23 in bold). This positive correlation indicated that the higher the levels of trait anxiety in the child (as reported by the mother) the higher the child's vigilance towards threatening stimuli would be. A positive correlation between the dot probe bias score and the child's self-report of state anxiety also approached significance ($r = .23$, $p = .05$). (See Table 23 in bold). This positive correlation indicated that the higher the levels of state anxiety in the

child the higher the levels of attention towards threatening stimuli the child would experience.

No significant correlations were found between maternal or child reports of depression and the dot probe bias score. This finding puts forth the argument that threat-related ABs towards pictorial stimuli would be specific to anxiety and not to depression.

Table 23

Correlations between self-report and maternal reported trait, state anxiety and depression and the dot probe bias score

	1	2	3	4	5	6	7
1. Self-reported trait anxiety (RCADS)	1	.59**	.70**	.33*	.26*	.76**	.06
2. Mother's reports of child's trait anxiety (RCADS)		1	.44**	.67**	.34*	.45**	**.25**
3. Self-reported depression			1	.33*	.31**	.66**	.04
4. Mother's reports of child's depression				1	.40**	.33*	.07
5. Self-reported state anxiety (STAIC)					1	.21	**.23**
6. Self-reported trait anxiety (STAIC)						1	-.00
7. Dot probe bias score							1

* $p < .05$, ** $p < .01$ (two-tailed)

A multiple regression analysis was carried out to test whether state and trait anxiety could interact. The dot probe bias score was entered as the dependent variable. Trait and state anxiety were centred and the state * trait interaction term computed. The state* trait interaction term was found not to be significant. See Table 24. This finding indicates that state anxiety would not be a moderator in the relationship between trait anxiety in the child and the dot probe bias score.

Table 24

Multiple Regression Analysis for the Interaction Term State X Trait Anxiety predicting the Dot Probe Bias Score (N= 71)

Variable	B	SE B	β
State anxiety centred	0.37	0.34	.16
Trait anxiety centred	0.82	0.73	.38*
Interaction term state x trait anxiety	-0.05	0.05	-.15

To explore whether the emergence of an AB towards threatening pictorial stimuli in high trait anxious children would be dependent on age, the moderating effects of age on the link between maternal reported trait anxiety in the child and the dot probe bias score was looked at. The interaction term chronological age (CA) X dot probe bias score was found not significant (B = -.03, p = .83). See Table 25. This finding indicates that the emergence of an anxious-related AB towards pictorial stimuli is not dependent on age.

Table 25

Multiple Regression Analysis for the Interaction Term Chronological age (CA) X Dot Probe Bias Score predicting Trait anxiety in the child (reported by the mother) (N= 71).

Variable	B	SE B	β
CA centred	-0.05	0.05	-.13
Dot probe bias score centred	0.10	0.06	.26
Interaction term CA X dot probe bias score	-0.00	0.00	-.03

4.4 A threat-related interpretive bias with the Story Task

4.4.0 Introduction

Correlation analyses were carried out at a one-tailed level of significance as the direction to the hypothesis was outlined. Based on previous research it was hypothesised that children with high levels of trait, social or separation anxiety would made more negative interpretations for threatening stories (Muris, Luermans et al. 2000; Muris, Merckelbach et al. 2000; Bögels & Zigterman, 2000). A multiple regression analysis was also carried out to explore moderating effects of age on the relationship between threat-related interpretive biases and anxiety in the child (Muris et al. 2007).

4.4.1 Calculation of power

The power of the statistical tests was calculated at an expected medium effect size. A correlation test was carried out with the sample size of Study 1 as an exploratory analysis. A sample size of 71 yield a power of .83. To further investigate interpretive biases with a story task a correlation and a multiple regression analysis were carried out with a combined data set from Study 1 and Study 2. A total of 98 participants had a complete data set for T scores. For a correlation test a sample size of 98 yield a power of .93. For a multiple regression analysis with three predictors a sample size of 98 yield a power of .89.

4.4.2 Threat-related interpretive biases: an exploratory analysis

No associations were found between the levels of trait anxiety and the number of negative interpretations made by the children for threatening physical stories or threatening social stories. However a significant positive correlation was found between the child's levels of separation anxiety (as reported by the mother) and the number of negative interpretations made for threatening social stories ($r = .35$, $p < .05$). Therefore children high in

separation anxiety appeared to make more negative interpretations about threatening social stories.

No significant correlations between the child's levels of social anxiety and threatening social stories were found. This unexpected finding could be explained by the social stories not being sufficiently threatening for children aged 7 to 14 with social anxiety. Social anxious concerns do not reach the highest prevalence rate up until adolescence (Ollendick & Hirshfeld-Becker, 2002).

4.4.3 A further exploration of threat-related interpretive biases

To further explore threat-related interpretive biases in separation anxious children, a variable combining stories depicting social threats in Study 1 and stories depicting separation threats in Study 2 was computed. Two other variables combining social threats (stories in Study 1) with panic and generalised threats (stories in Study 2) were computed. A one-tailed Pearson's correlation indicated that children with high levels of separation anxiety (as reported by the mother) made more negative interpretations for stories depicting social and separation anxious concerns ($r = .27$, $p < 0.05$). No significant correlations between the levels of trait anxiety in the child and negative interpretations for threatening separation/social stories were found. In addition no significant correlations between separation anxiety in the child and stories tapping into social and panic anxious concerns or into social and generalised anxious concerns were found. This finding is indicative of a cognitive specificity as the stories depicting separation and social anxious concerns appeared to be threatening for children with separation anxiety. See Table 26

Table 26

Correlation table between child and maternal reports of separation, social and trait anxiety in the child and negative interpretation of social/separation, social/panic and social/generalised anxious-related stories.

	1	2	3	4	5	6	7	8	9
1. RCADS child's report of separation anxiety	1	.46**	.76**	.45**	.28**	.41**	.07	.06	-.01
2. RCADS child's report of social phobia		1	.84**	.26**	.29**	.35**	-.07	-.05	.00
3. RCADS child's report of trait anxiety			1	.37**	.29**	.42**	-.06	-.04	-.06
4. RCADS parent's report of separation anxiety				1	.44**	.75**	.27**	.14	.04
5. RCADS parent's report of social phobia					1	.80**	-.03	-.02	.01
6. RCADS parent's report of trait anxiety						1	.06	.00	-.00
7. Negative interpretation of separation and social anxious-related stories							1	.67**	.45**
8. Negative interpretation of panic and social anxious-related stories								1	.51**
9. Negative interpretation of generalised and social anxious-related stories									1

** $p < .01$ (one-tailed)

To investigate whether age could be a moderator in the relationship between threat-related interpretive biases and separation anxiety in the child (as reported by the mother) a multiple regression analysis was conducted. The variables chronological age (CA) and negative interpretations of separation and social threatening stories were centred. The interaction term CA x negative interpretation of social/separation threatening stories were computed. It was found that the interaction term was not predictive of maternal reports of separation anxiety in the child (B = .08, p = .41). Thus, age was not a moderator in the link between threat-related interpretive biases and separation anxiety in the child.

4.5 Summary of main findings and future work

In this chapter the role of cognitive biases in childhood anxiety have been explored. Firslty it can be concluded that ABs towards angry faces can be observed in children with a separation anxious symptomatology. In consistency with developmental theories on ABs (Kindt et al. 1997; Kindt & van den Hout, 2001; Lonigan et al. 2001, 2004) an ABs towards angry faces was observed in the older group of children. There was a trend in the data that indicated that older children could also show an AB towards neutral faces. Further research exploring to what extent ambiguous facial expressions can capture the attention of children highly anxious of social situations is merited (Cooney et al. 2006).

Interestinlgy in line with adult research AB towards angry faces appeared to be specific of an anxious and not a depressive symptomatology (Bradley et al. 1997; Mogg & Bradley 1999). It should be noted however that when maternal reports of the child´s depression were controlled for the link between AB towards angry faces and separation anxiety in the child only approached significance. Further research including other informants would be useful for ascertaining to what extent ABs towards angry faces are specific to anxiety.

When searches for angry faces were explored in the absent condition to examine whether children with separation anxiety would show an altered gaze behaviour tendency, little evidence for altered search strategies was found.The results indicated that children high in separation anxiety appeared to be checking and rejecting the angry distractors (upside-down angry faces) serially before deciding that the target was absent. Interestingly this serial search does not constitute an altered way of searching as it has been observed in adults when performing search tasks (Chun & Wolfe, 1996). Distractors would

have target features that would increase the RTs for terminating the search. The reason why distractors in the angry conditions would have a high activation for children with separation anxiety could be explained by an inversion effect. The inversion effect occurs when there is a difficulty in the recognition of objects presented upside-down (Sangrigoli & de Schonen, 2004).

Contrary to what it was hypothesised no anxious-related ABs significantly emerged for socially anxious children. Feasible explanations on why anxious-related ABs would emerge in separation anxious children but not in socially anxious children are given in Chapter 7.

A second pattern of results was found when exploring ABs towards threatening pictorial stimuli. The correlation between maternal reports of trait anxiety in the child and a dot probe bias score (which is indicative of ABs towards threat-related pictures) approached significance. It was a positive correlation that suggested that the higher the levels of trait anxiety in the child (as reported by the mother) the more a child would show vigilance towards threatening pictorial stimuli. A positive correlation between the child's state anxiety and the dot probe bias score also approached significance. The fact that no significant correlations were observed could lie in a poor validity and reliability of the task (Waters et al. 2004; Schmukle, 2005). In addition it should be borne in mind that the power for the analyses of the MDPT did not achieve the desirable power of .80 (Cohen, 1992). A lack of power could also play a role in not finding significant results.

Consistent with previous research state anxiety was not found to be a moderator between high trait anxiety in the child and vigilance towards threat (Muris, Rapee, Meesters's et al. 2003). However further research on the possible moderating effects of state anxiety on ABs towards threat in highly anxious children is merited as adult research has found that state anxiety can

enhance threat-related ABs in high trait anxious individuals (Williams et al. 1988; MacLeod & Mathews, 1988) . In support of the argument that ABs towards threat are specific to anxiety, depression in the child was not found to correlate with the dot probe bias score.

In opposition to the findings obtained with facial expressions and separation anxiety, age did not moderate a link between trait anxiety in the child and ABs towards threatening pictures. This finding is not in agreement with developmental theories on ABs. It could be argued that the MDPT was not sensitive enough to capture the developmental course of threat-related ABs. Indeed there is a need to determine an inter-trial interval adequate for children, as so far the inter-trials used are based on adult research (Vasey et al. 2003). It could also be argued that the pictorial stimuli used in the MDPT did not have a sufficient threatening value for older children high in trait anxiety. The limitations of employing pictorial stimuli have been already outlined (Waters et al. 2004). Moreover convergent research argues that faces are more ecologically valid stimuli for humans than pictures (Ohman et al. 2001; Haviland & Lelwica, 1987; Turati & Simion, 2002).

In line with the argument that there is cognitive specificity in threat-related cognitive biases, a significant positive association was found between separation anxiety (as reported by the mother) and the number of negative interpretations made for stories depicting separation and social anxious concerns.

CHAPTER 5

The influence of Childrearing Practices and Maternal Psychopathology on Childhood Anxiety

5.1 Introduction

Family factors have been observed to play a role in childhood anxiety. For example, an accepting parenting style appears to protect children from anxiety and a negative mother-child negative relationship can contribute to the emergence of internalising problems in the child (Weisz, 2002). Poor maternal mental health has also been found to contribute to anxiety in children (Scott et al. 1991; Costa & Weems, 2005; review by Wood et al. 2003; Biederman et al. 2006). Interestingly maternal depression has been associated with dysfunctional parenting (Herwig, et al. 2004;Cummings et al. 2005).

Recent empirical work has started to looked at maternal childrearing practices and specific anxious symptomatologies (Aycicegi, 2002; Wood, 2006). These work has shown that maternal overprotection can increase the child's levels of separation or social anxiety. Interestingly Wood (2006) suggests that the influence of maternal overprotection would be specifically linked with separation anxiety among children with AD. A mother-child emotional relationship has also been linked to a child's internalizing disorders with the EE index, which measures parental attitudes and feelings towards the child (McCarty & Weisz 2002). However no study to date has specifically looked at links between a mother-child emotional relationship and a child's anxiety using the EE index.

There is growing empirical research on the influence of parental mental health on specific anxious symptomatologies. For example offspring of parents with social anxiety have been found to experience social anxiety themselves (Merikangas et al. 2003). In addition high levels of parental depression have

been specifically linked to separation anxiety in the offspring (Biederman et al.2001; Kearney et al. 2003). The co –occurrence of parental depression and parental panic or phobic anxiety has also been found to increase the risk for separation anxiety (Biederman et al. 2001; Kearney et al. 2003). Interestingly a genetic transmission of risk has been outlined in which an anxious parent could give birth to a child with a biological predisposition to anxiety (Rapee, 2001; Kagan & Snidman, 1999).

Despite the emerging literature on parental mental health and anxiety in children, more work is needed to ascertain the influence of parental mental health on children's anxiety in the general population. More work is also merited to single out parental childrearing practices that could specifically influence an anxious symptomatology and not another. It is also of interest to investigate the influence of diverse parental factors on the child's anxiety taking into account that the manifestation of anxiety phenomena is dependent on developmental changes that occur throughout childhood (Muris, 2006). For example it has been shown that social worries are highly prevalent in adolescence (Ollendick & Hirshfeld-Becker, 2002) whereas worries related to separation from the caregiver decrease in children older than 10 years (Bell-Dolan et al. 1990; Costello et al. 2003).

The aim of this chapter is to advance the understanding of the influence of parental factors on childhood anxiety examining the second hypothesis of the thesis. Due to high levels of attrition in the paternal measures only the influence of maternal mental heath variables and childrearing practices on anxiety in the child are explored.

First the influence of parenting styles on anxiety in the child is explored. Consistent with the aforementioned literature the association between maternal depression and parenting styles is looked at. Second the influence of a mother-child relationship and of maternal overprotective attitudes (as measured by EE) on childhood anxiety is explored. The specific influence of

maternal overprotection over a child's social or separation anxiety is looked at. The last sections of the chapter are focused on maternal mental health variables. Following Biederman's et al. (2001) and Kearney's et al. (2003) work the effects of panic-phobic maternal anxiety and depression on a child's separation anxiety are looked at in a high risk sample. To compare the levels of separation anxiety in the offspring whose mothers are high in depression and/or panic-phobic anxiety with those whose mothers are low in these disorders, mothers were classified as high or low in depression and panic-phobic anxiety. This classification was done based on cut-off points of questionnaire manuals. (See Chapter 3).The main effects of maternal depression on a child's separation anxiety were also explored treating maternal depression as a continuous variable. At the end of the chapter the main findings and future directions for research are presented.

In all the analyses chronological age was controlled for to examine whether any links found between maternal factors and childhood anxiety would hold irrespective of age in the child. Interestingly, there is empirical work that provides longitudinal evidence of the influence of early parent-infant relationships on later physiological functioning (i.e. heart rate activity) that could be associated with anxiety (Burgess, Marshall, Rubin & Fox, 2003). When looking at parenting styles or EE variables, maternal depression was controlled for to counteract any biases in maternal reporting (Ginsburg et al. 2004) and to explore the potential influence of maternal depression on a child's anxiety (Biederman et al. 2001)

5.2 The influence of parenting styles on childhood anxiety

5.2.0 Introduction

The measure of parenting styles involved the mother's self-report and the mother's report about her partner's parenting styles. However only the mother's self-report was included in the analysis. The study was focused on the effects of maternal childrearing practices on the child's anxiety due to high levels of attrition in paternal measures. Mean standard scores are presented in Table 27.

Table 27

Means and SD of the mother's reported authoritative and authoritarian parenting styles about herself and the partner

	Mean (*SD*)	*N*
Mother's self-report of authoritative style	61.48 (7.19)	50
Mother's report of partner's authoritative style	56.71 (10.36)	32
Mother's self-report of authoritarian style	22.86 (6.18)	50
Mother's report of partner's authoritarian style	21.59 (6.02)	32

To examine whether a mother's authoritarian or authoritative style could influence a child's separation, social or trait anxiety a Pearson's correlation was carried out. The fixed level of significance was one-tailed because the direction of the effects in the hypothesis was outlined. It was hypothesised that a mother's authoritative style would diminish the levels of anxiety in the child whereas a mother's authoritarian style would increase a child's anxiety levels. The sample in Study 1 was employed as data on parenting styles was collected for this study.

5.2.1 Calculation of Power

The power of the statistical tests was calculated at an expected medium effect size. For the statistical analysis the sample of Study 1 which consisted of 71 participants was employed. However of the 71 participants only 50 had complete data on maternal parenting styles. For correlation analyses one-tailed, a sample size of 50 yield a power of .70.

5.2.2 Results

No significant correlations were found between maternal reports of trait or separation/social anxiety in children and the mother's self-report of an authoritative style. However it was found that the mother's self-report of an authoritative style was significantly negatively correlated with children's self-report of separation ($r = -.31$, $p < .05$) and total trait anxiety ($r = -.24$, $p < .05$) as measured by RCADS. See Table 28. Thus, the higher the levels of separation and trait anxiety (as reported by the child) the less accepting the mother's style was towards the child. These correlations held when chronological age was controlled for. The mother's self-report of an

authoritative style significantly correlated with children's self-report of separation ($r = -.35$, $p < .05$) and total trait anxiety ($r = -.29$, $p < .05$).Table 28

Table 28

Correlations between the child's separation/social and trait anxiety (as reported by the mother and the child) and the mother's self-reported authoritative and authoritarian style).

	1	2	3	4	5	6	7	8	9
1. Mother's report of child's separation anxiety	1	.57**	.77**	.51**	.34**	.48**	.37**	-.10	.13
2. Mother's report of child's social anxiety		1	.85**	.28*	.46**	.43**	.33**	-.16	.13
3. Mother's report of child's total trait anxiety			1	.37**	.48**	.53**	.45**	-.14	.20
4. Child's report of separation anxiety				1	.55**	.78**	.51**	-.31*	-.05
5. Child's report of social anxiety					1	.89**	.69**	-.19	.01
6. Child's report of total trait anxiety (rcads)						1	.76**	-.24*	-.10
7. Child's report of trait anxiety (staic)							1	-.15	-.05
8. Mother's self-report of authoritative style								1	-.33**
9. Mother's self-report of authoritarian style									1

* $p < .05$, ** $p < .01$ (one-tailed)

In line with the literature it was explored whether general levels of maternal anxiety (trait anxiety) or depression could be having an influence on the relationship between an authoritative style and an anxious symptomatology in the child. Two first order partial correlations (at a one-tailed significance) controlling for maternal trait anxiety and depression were carried out. When maternal trait anxiety was partialled out the relationship between the mother's authoritative style and the child's self-reported separation and total trait anxiety held. See Table 29.

Table 29

Correlations between mothers' self-report of authoritative style and children's report of separation and trait anxiety. Trait anxiety in the mother is partialled out.

	1	2	3
1. Mother's self-report authoritative style	1	-.30*	-.25*
2. Child's report of separation anxiety		1	.73**
3. Child's report of total trait anxiety scale			1

* $p <.05$, ** $p <.01$ (one-tailed)

However when depression in the mother was partialled out the relationship between the mother's authoritative style and the child's self-reported total anxiety no longer held. A hierarchical regression analysis was not conducted to explore the effects of depression on the relationship because the sample size ($N = 50$) in the regression model yield a power of .65 for an expected medium effect size. A two-tailed Spearman's correlation indicated that depression in the mother significantly correlated with her authoritative style ($r_s = .-29$, $p < .05$) and with the self-reported total trait anxiety in the child ($r_s = .35$, $p < .05$). See Table 30. This result suggests that the relationship observed between the mother's authoritative style and the trait anxiety in the child could be due to the levels of depression in the mother and not to a direct path between an authoritative style and the child's trait anxiety. Interestingly a relationship between depression in the mother and the child's self-reported separation anxiety was also found ($r_s = .36$, $p = .01$, two-tailed).

Table 30

Correlations between the mother's depression and self-reported authoritative style and the child's self-reported trait anxiety

	1	2	3
1. Mother's levels of depression (bdi)	1	-.29*	.35*
2. Mother's self-reported authoritative style		1	-.24
3. Child's report of trait anxiety scale (rcads)			1

* $p < .05$ (two-tailed)

5.3 The influence of an adverse mother-child relationship and parental overprotective attitudes (as measured with the EE index) on childhood anxiety

It was hypothesised that an adverse parent-child emotional relationship would be associated with enhanced levels of trait and separation/social anxiety in the child (Ollendick & Hirshfeld-Becker, 2002; Costa & Weems, 2005; Peleg et al. 2006). An adverse mother-child emotional relationship was characterized by difficulties expressed by the mother of getting along or by inability to communicate with the child. It was also hypothesised that parental overprotective attitudes would be associated with enhanced levels of separation anxiety in the child (Wood 2006). To explore these hypotheses the combined data set was employed. A total of 110 participants had a complete data set. A series of *t*-test were carried out. In addition a series of MANOVA's were carried out to control for chronological age in the child and to control for maternal depression.

5.3.1. Calculation of Power

The power of the statistical tests was calculated at a moderate effect size. For a complete data set of 110 participants a two-tailed *t*-test lend a power of .73. A MANOVA with 2 groups (unfavourable vs. favourable relationship) and six dependent variables (DV) which were maternal and child reports of separation, social and trait anxiety lend a power of .98. A

MANOVA with 2 groups (maternal high overprotection vs. low overprotection) and 2 DV which were maternal and child reports of separation anxiety lend a power of .99.

5.3.2. Results: an unfavourable mother-child emotional relationship and childhood anxiety

A t-test showed no significant mean differences in the child's reports of separation anxiety ($t(90$) = -.13, p = .89) or in the mother's reports of separation anxiety ($t(89)$ = .20, p = .84) for an unfavourable mother-child relationship (this is neutral or negative) against a favourable one. The mother-child emotional relationship was computed as a binary variable (1 = positive relationship; 2 = neutral/negative) for this analysis. When comparing the mean differences in the child's levels of social anxiety (as reported by the child and the mother) another t-test showed no significant mean differences in social anxiety as reported by the child ($t(90)$ = -.58, p = .56) or the mother ($t(89)$ = -.48, p = .63) for an unfavourable mother-child relationship against a favourable one. No significant mean differences for trait anxiety as reported by the child ($t(90)$ = -.74, p = .45) and the mother ($t(89)$ = .16, p = .86) were found in an additional t-test for the two mother-child relationships compared.

In a second set of analyses, chronological age and maternal depression were co varied out with a MANOVA. No main effects of an unfavourable mother-child emotional relationship on self-reported separation anxiety [$F(1,84)$ = .00, p = .94] or maternal reported separation anxiety [$F(1,84)$ = .10, p = .74] were found significant. In addition no main effects of an unfavourable mother-child emotional relationship on self-reported social anxiety [$F(1,84)$ = .08, p = .76] or maternal reported social anxiety [$F(1,84)$ = .02, p = .88] were found significant. Finally no main effects of an unfavourable mother-child emotional relationship on self-reported trait anxiety [$F(1,84)$ = .18, p = .66] or maternal reported trait anxiety [$F(1,84)$ = .48, p = .49] were found significant.

The covariate chronological age was significantly related to self-reported separation anxiety [$F(1, 84) = 4.95$, $p < .05$, partial $\eta^2 = .05$]. For the older children the levels of self-reported separation anxiety were ($M = 53.96$, $SE = 1.80$). For the younger children the levels of self-reported separation anxiety were ($M = 49.22$, $SE = 1.70$). This finding is unexpected as separation anxious symptoms should decrease with age (Bell-Dolan et. al., 1990; Costello et al. 2003). The covariate maternal depression was also found to be significantly related to maternal reports of separation [$F(1, 84) = 7.83$, $p < .01$, partial $\eta^2 = .05$] social [$F(1, 84) = 14.05$, $p < .01$, partial $\eta^2 = .14$] and trait anxiety [$F(1, 84) = 28.35$, $p < .01$, partial $\eta^2 = .25$]. The higher the levels of maternal depression the higher the levels of separation, social and trait anxiety in the offspring (as reported by the mother).

5.3.3. Results: maternal overprotection and separation anxiety in the child

Ratings of maternal overprotection were based on the EE positive comments variable of the FMSS (Magana et al. 1986). Only the EE positive comments variable was taken into account for an overprotection rating because mothers did not exhibit excessive detail about the past nor they expressed any statement of attitude. Thus, the EE positive comments variable was coded as a binary variable (0 = four or less positive comments, 1 = five or more positive comments). Five or more positive comments indicate borderline overprotection. This coding follows the instructions of the FMSS manual (Magana et al. 1986). The number of positive comments did not only serve to examine overprotective attitudes in the mother's behaviour but it also served to examine maternal rejecting attitudes towards the child.

A t-test showed little evidence for significant mean differences in the child's separation anxiety in relation to low maternal praise (0-4 positive comments about the child) and high maternal praise (5 or more positive comments about the child). Regarding the child's levels of separation anxiety (as reported by the child) the t value and significance was $t(90) = .43$, $p = .66$. Regarding the child's levels of separation anxiety (as reported

by the mother) the *t* value and significance was $t(89) = -.38$, $p = .70$. In addition no main effects were significant for self-reported separation anxiety [$F(1,84) = .03$, $p = .84$] and maternal reported separation anxiety [$F(1,84) = .41$, $p = .52$] when maternal depression and chronological age were controlled for with a MANOVA.

An additional *t*-test was conducted to explore possible links between maternal overprotection and social anxiety in the child (Aycicegi 2002) . The *t*-test showed mean differences for the child's social anxiety (as reported by the mother) for less maternal praise exhibited towards the child ($M = 47.26$, $SE = 1.46$) compared to more maternal praise ($M = 43.68$, $SE = 1.10$). These mean differences however approached significance $t(89) = 1.90$, $p = .06$. The results suggest that less maternal praise could be associated with enhanced social anxiety in the child.

When maternal depression and chronological age were controlled for with a MANOVA, the main effect of maternal praise over the child's levels of social anxiety again approached significance [$F(1,98) = 3.20$, $p = .07$, partial $\eta^2 = .03$]. This finding is suggestive of the weakness of the association between maternal praise and children's social anxiety.

5.4 Does maternal depression and maternal panic/phobic anxiety influence a child's separation anxiety in a high risk sample?

5.4.0 Introduction

Following Biederman's et al. (2001) and Kearney's et al. (2003) work the influence of depression and panic/phobic anxiety in the mother on separation anxiety in the offspring was first explored with the sample in Study 2. Both authors found a link between mothers' depression and/or panic and phobic anxiety and the risk for clinical separation anxiety in the offspring. Therefore it was aimed to investigate whether children whose mothers were high in depressive symptoms and/or panic-phobic anxiety were at risk of a separation anxiety disorder. Levels of separation anxiety in

the offspring were looked at in mothers high in symptoms of depression and in mothers whose depressive symptoms fell within the normal range. Levels of separation anxiety in the offspring were also looked at in mothers high in symptoms of panic or phobic anxiety and in mothers whose panic/phobic symptoms fell within the normal range. Offspring whose mothers had depression scores that were 12/13 and above in the BDI-II were classified at risk of separation anxiety. This cut off was selected based on Lasa's et al. (2000) empirical work. Offspring whose mothers had panic scores that were 10 and above in the APPQ were also classified at risk of separation anxiety. The BAI questionnaire was not used for this classification as maternal panic-like symptoms measured with the BAI fell within the normal range.

To explore the influence of maternal depression and panic-phobic anxiety on the child's separation anxiety a series of MANOVAs were carried out. Chronological age was controlled for based on the literature that argues that a separation anxious symptomatology decreases with age (Bell-Dolan et. al., 1990; Costello et al. 2003). Chronological age was also controlled for in light of the previous findings, that showed that the covariate chronological age was related to child reports of separation anxiety. When looking at the MANOVAs' results not only the main effects of maternal depression and panic-phobic anxiety over a child's separation anxiety but also the interaction effects were reported. Indeed the literature gives evidence to support the independent and conjoint influence of maternal depression and panic anxiety on separation anxiety in the child (Biederman et al. 2001; Kearney et al. 2003).

5.4.1 Calculation of Power

For a sample size of 60 a MANOVA with four groups (high or low panic-phobic anxiety, high or low depression) and two DV (maternal and child reports of separation anxiety) yield a power of .99 at a moderate effect size. The interaction effects for a MANOVA with the same four groups, three predictors (panic anxiety, depression, the panic x depression

interaction term) and two DV (maternal and child reports of separation anxiety) also yield a power of .99. A two-tailed t-test lend a power of only .60.

5.4.2 Results

Three multivariate analyses of variance (MANOVA) were carried out. (1) In the first one self-reported and maternal reported separation anxiety were the DV and high/low maternal depression (based on the BDI) and high/low panic anxiety (based on the BAI) were the IV. (2)The second one differed from the previous one in the measure of panic assessment. The interoceptive subscale from the APPQ was used instead of the BAI. (3) In the third MANOVA, self-reported and maternal reported separation anxiety were again the DV and high/low maternal depression (based on the BDI) one of the IV. However in this analysis high/low maternal phobic anxiety (based on the APPQ) was the other IV. A variable which included the agoraphobia and phobia subscale in the APPQ was computed. Based on the above mentioned literature that argues that the levels of separation anxiety in the child are dependent on age, chronological age was entered as a covariate.

For the first MANOVA the analyses showed no significant multivariate effect of maternal depression "low maternal depression" versus 'high maternal depression" on levels of self-reported or maternal reported separation anxiety [$F(2,54) = 2.18$, $p = .12$, partial $\eta^2 = .075$]. In addition no significant multivariate effect was observed for "low levels of maternal panic anxiety" versus "high levels of maternal panic anxiety" on levels of self-reported and maternal reported separation anxiety [$F(2,54) = 0.69$ $p = .50$, partial $\eta^2 = 025$]. This result indicated that there were not statistically differences among the maternal depression (BDI) and maternal panic anxiety (BAI) groups on a linear combination of the DV. However a main significant effect of maternal depression on the child's separation anxiety as reported by the mother was observed [$F(1, 55) = 4.45$, $p < .05$, partial $\eta^2 = .07$]. A t- test showed that mothers experiencing high levels of depression

significantly reported higher levels of separation anxiety for their offspring (M = 5.0, SE = .55) compared to mothers experiencing low levels of depression (M = 3.5, SE = .43) $t(58)$ = -2.1, p < .05, r = .26).

It was also found that the covariate chronological age was significantly related to maternal reports of separation anxiety in the child [$F(1, 55)$ = 4.66, p < .05, partial η^2 = .07]. Mean differences for maternal reports of separation anxiety for the older (M = 4 , SE = .58) compared to the younger (M = 5.57, SE = .65) group of children were observed. The older the child the lower his/her levels of separation anxiety. This finding is consistent with the developmental course of worries in children.

In order to further explore whether high levels of depression in the mother or high levels of panic in the mother could be contributing to the child's separation anxious symptomatology, the interoceptive subscale in the APPQ was entered in the analysis instead of the BAI.

The analyses showed no significant multivariate effect of maternal depression "low maternal depression" versus 'high maternal depression" on levels of self-reported or maternal reported separation anxiety [$F(2, 54)$ = 3.0, p = .05, partial η^2 = 10]. Nevertheless the p value approached significance. Once more no significant multivariate effect was observed for "low levels of maternal panic anxiety" versus "high levels of maternal panic anxiety" on levels of self-reported and maternal reported separation anxiety [$F(2,54)$ = 0.57, p =.59, partial η^2 = .01]

The covariate chronological age was again significantly related to maternal reports of separation anxiety in the child [$F(1, 55)$ = 7.66, p < .01, partial η^2 = 12]. The older the child the lower his/her levels of separation anxiety.

Once more a main significant effect of depression in the mother on maternal reports of the child's separation anxiety was observed [$F(1, 55)$ = 5.99, p < .05, partial η^2 = .09]. In addition a significant interaction effect of

maternal depression and maternal panic anxiety on the DV was observed [$F(1, 55) = 5.00$, $p < .05$, partial $\eta^2 = .08$]. To explore this interaction a simple effect analysis in which the differences between high and low anxiety groups for high depression on one hand and for low depression in the other were tested. No significant differences between high and low anxiety groups for high [$F(1, 28) = 1.92$, $p = .17$] or low depression [$F(1, 28) = .72$, $p = .40$] were found. When plotted, the data showed that for mothers high in panic anxiety and low in depression the scores on separation anxiety fell below that for mothers low in panic anxiety and low in depression. See Figure 10.
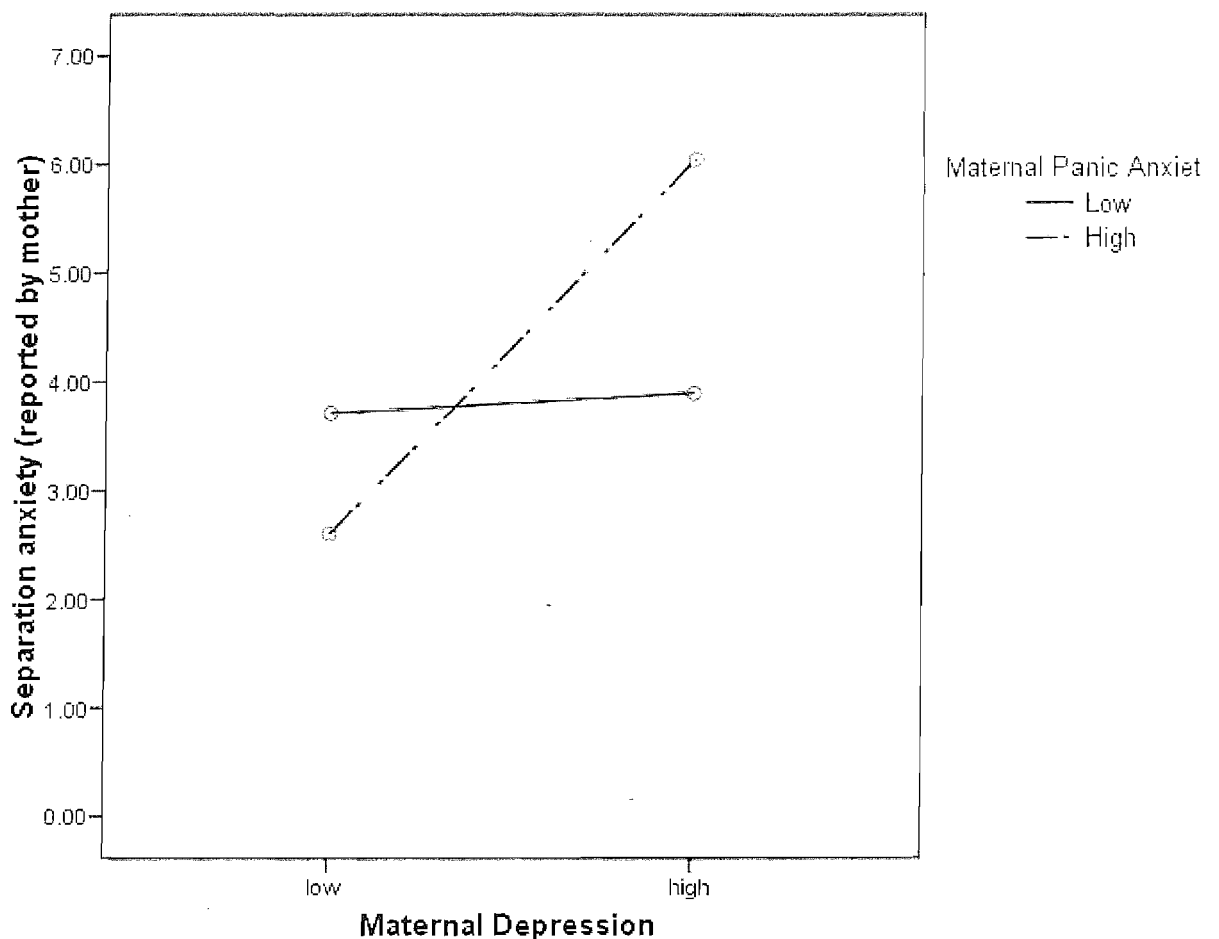
Figure 10. Graph showing the interaction between maternal depression and panic anxiety over the child's separation anxiety (as reported by the mother)

The non significant results for the simple effects analysis and the graph suggest that the interaction effect of maternal depression and maternal panic anxiety on separation anxiety could be an effect of high anxiety being mediated by depression.

To look at whether maternal depression or maternal phobic anxiety could be contributing to the child's separation anxious symptomatology the third MANOVA was carried out.

The analysis showed no significant multivariate effect of maternal depression on levels of self-reported or maternal reported separation anxiety [$F(2, 54) = .44$, $p = .64$, partial $\eta^2 = .01$]. No significant multivariate effect of maternal phobic anxiety on levels of self-reported or maternal reported separation anxiety [$F(2, 54) = .59$, $p = .55$, partial $\eta^2 = .02$] were observed. In addition contrary to what would be expected no main significant effects of maternal depression or of maternal phobic anxiety on the child's separation anxiety were observed. In addition no significant interaction effects were found.

In corroboration with the previous results the covariate chronological age was significantly related to maternal reports of separation anxiety in the child [$F(1, 55) = 4.88$ $p < .05$, partial $\eta^2 = .08$].

5.5. A further analysis on the influence of maternal depression on a child's separation anxiety

5.5.0 Introduction

In line with the literature and consistent with the previous findings, it was hypothesised that the higher the levels of depression in the mother the higher the levels of separation anxiety in the child would be (Kearney et al. 2003; Biederman et al. 2001). To investigate this hypothesis the combined data set was employed. A total of 98 participants had a complete data set

for child reports of separation anxiety. For maternal reports of separation anxiety a total of 93 participants had a complete data set. Maternal depression was treated as a continuous variable instead of treating it as a dichotomous one like in the previous analysis because it was not aimed to study maternal depression in a high risk sample for this analysis. Two linear and two hierarchical regression analyses in which chronological age was controlled for were carried out to explore this hypothesis.

5.5.1 Calculation of power

Power was calculated at an expected moderate effect size. For a complete data set of 98 participants on child reports of separation anxiety and 93 participants on maternal reports of separation anxiety a linear regression analysis lend a power of .96 and .95 respectively. For multiple regression analyses with two predictors a sample size of 98 lend a power of .93 and a sample size of 93 lend a power of .91.

5.5.2 Results

Two linear regression analyses showed that maternal depression was predicting the child's separation anxiety, as reported by the child ($B = .19, p < .05$) and as reported by the mother ($B = .29, p < .01$). Maternal depression was found to predict the child's separation anxiety, as reported by the child ($B = .23, p < .05$) and by the mother ($B = .29, p < .01$) even after controlling for chronological age. These findings indicate that the higher the levels of depression in the mother, the higher the levels of separation anxiety in the child irrespective of his/her age. See Table 31 and Table 32. An additional analysis showed that maternal depression was not significantly correlated with the EE index of overprotection (1 = four or less positive comments; 2 = five or more) ($r_s = -.08, p = .41$). This analysis was carried out based on the literature that draws associations between maternal depression and overprotection and separation anxiety (Wood, 2006; Bierderman et al. 2001; Kearney et al. 2003).

Table 31

Summary of Hierarchical Regression Analysis for Maternal Depression predicting Child's reports of Separation Anxiety (N= 98).

Variable	B	SE B	β
Step 1			
Chronological age (CA)	0.11	0.06	.19
Step 2			
CA	0.13	0.06	.23*
Maternal Depression	0.32	0.14	.23*

Note. R^2 = .03 for Step 1; ΔR^2 = .05* for Step 2 (p <.05)

Table 32

Summary of Hierarchical Regression Analysis for Maternal Depression predicting Maternal reports of the child's Separation Anxiety (N= 93).

Variable	B	SE B	β
Step 1			
Chronological age (CA)	0.00	0.04	.01
Step 2			
CA	0.03	0.04	.06
Maternal Depression	0.30	0.11	.29**

Note. R^2 = .00 for Step 1; ΔR^2 = .08** for Step 2 (p <.01)

5.6 Summary of main findings and future work

5.6.1 Parenting Style

The mother's self-report of an authoritative style was found to be significantly associated with reduced levels of the child's self-reported trait and separation anxiety The fact that an increase in social worries throughout childhood was not evident (see Table 8) could account for the failure in finding an association between the mother's authoritative style and social anxiety in children. Indeed social worries should increase with age (Ollendick & Hirshfeld-Becker, 2002). It should be noted that no significant associations were found between an authoritative style and maternal reports of the child's trait and separation anxiety. Further research should explore the consistency of the link between an authoritative style and a child's trait and separation anxiety with multiple informants (Kagan et al. 2002). The link between an authoritative style and a child's separation and trait anxiety held regardless of the age of the child which suggests that this link is consistent throughout the developmental course of anxieties in children.

A further exploration of the association between an authoritative style and an anxious symptomatology indicated that depression in the mother could be influencing the relationship. The fact that depression in the mother was associated with both the mother's authoritative style and the child's separation or trait anxiety indicates that maternal depression could be directly impinging onto the child's anxiety. A somewhat striking finding was that maternal trait anxiety was found not to have an influence on the relationship between an authoritative style and the child's separation and/or trait anxiety. However there is some evidence that suggests that the association between parental trait anxiety and childhood anxiety would only hold for clinically anxious parents (Bernstein et. al., 2004, Biederman et. al., 2001).

Regarding an authoritarian parenting style, no significant associations were found between this style and the child's anxious symptomatology. A possible explanation of this finding is given in Bögels and Brechman-Toussaint review (2006) where it is pointed out that parents have a tendency to under-report maladaptive parenting behaviours.

5.6.2 A mother-child emotional relationship and maternal overprotective attitudes

A significant association between an unfavourable mother-child emotional relationship and the child's levels of separation, social or trait anxiety was not found. Neither was a significant association between maternal overprotective attitudes and a child's separation anxiety found. As expected, chronological age appeared to be influencing the levels of separation anxiety in the child. A finding in line with the literature which shows that the manifestation of anxious symptoms changes throughout childhood (Muris, 2006).

The fact that a mother-child emotional relationship and the mother's overprotective attitudes towards the child (as measured by EE) appeared not to significantly influence a child's anxious symptomatology could be explained by some data that suggests that the link between EE and a child's anxiety could be a weak one and warrants further investigation (Schimmelmann, Meng, Koch, Karle, Preuss & Schulte-Markwort, et al. 2003).

It was observed that children experienced less social anxiety when the mother made five or more positive comments. This pattern of results only approached significance. Nevertheless it is in line with empirical work that shows that an accepting parenting style reduces the levels of social anxiety in children (Hummel & Gross, 2001). In addition reports of rejection have been found to be more consistent for individuals with social phobia than with other anxiety disorders (Rapee 1997, Rapee & Melville 1997). These results however should be treated with caution. Future research

should explore to what extent the number of positive comments in the EE index is a psychometrically adequate measure of maternal rejection.

5.6.3 Maternal panic-phobic anxiety and depression in a high risk sample

Consistent with the literature, offspring of mothers high in depressive symptoms had higher levels of separation anxiety, as reported by their mother (Biederman et al. 2001, Kearney et al. 2003). A main effect of high maternal panic anxiety on the levels of separation anxiety in the child was not significant. Interestingly the effect of high maternal panic anxiety on maternal reports of separation anxiety in the child appeared to be mediated by maternal depression. Further research should explore whether mothers high in depression or panic anxiety had a reporting bias of their offspring anxious symptomatology.

No significant effects of maternal phobic anxiety over the child's separation anxiety were observed. To date one study outlines a link between parents diagnosed with phobic anxiety and separation anxiety in the offspring (Kearney et al. 2003). There is a need to examine this link in a community sample.

5.6.4 Maternal depression: a further exploration

When maternal depression was treated as a continuous variable the influence of depression in the mother on the child's separation anxiety once more emerged even when controlling for chronological age in the child. The link between maternal depression and the child's separation anxiety was significantly found for both informants the mother and the child. This finding argues in favour of the consistency of the aforementioned association regardless of the developmental course of separation anxious concerns.

CHAPTER 6

An Exploration of feasible Pathways in the Transmission of Anxiety from the Mother to the Child

6.1 Introduction

In this chapter maternal mechanisms of transmission of anxiety to the child are investigated. Based on empirical work and on Rapee's (2001) model on the development of generalised anxiety the feasibility of a cognitive- mediated model was examined (Forman & Davies, 2003; Grych et al. 2004; Luecken et al. 2006). In his model of the development of anxiety Rapee (2001) proposed that parental overprotection could augment a child's vulnerability to anxiety by increasing their tendency to perceive threat (see also Hudson & Rapee 2004). However modelling has also been suggested as a possible pathway through which cognitive biases could stem from the relationship between parental negative reactions (i.e. parental anxious responses) and childhood anxiety (Rachman 1991; Morren et al. 2004); thus it is also taken into consideration in the analyses.

Firstly it was explored whether ABs towards angry or neutral faces could be a mediator between maternal psychopathology or childrearing practices and separation anxiety in the child. Only separation anxiety in the child was looked at due to the interesting links found between cognitive and maternal factors and this anxious symptomatology. Based on the results in Chapter 4 a model in which ABs could be a mediator between maternal variables and a child's separation anxiety was examined for the older group of children. Specifically, in consistency with previous empirical work this model was examined for children aged over 10 (Kindt et al. 2003).

Secondly it was explored whether interpretive biases for threatening stories could also be a mediator in the communication of anxiety from the mother to the child.

6.2 Calculation of Power

The combined data set was used. For 98 participants with complete data set on child reports of separation anxiety, linear regression analyses lend a power of .96. For the older group of children (N = 54) linear regression analyses lend a power of .79

To increase the power of the mediation analyses, structural equation modeling (SEM) techniques designed to evaluate how well a mediation model represents the data were used. The statistical package employed to carry out SEM was AMOS 6.0. Following Bollen and Stine (1990) guidelines, bootstrapping methodologies were employed. The authors point out the adequacy of using bootstrapping methodologies to study the sampling variability of estimates of indirect effects in mediation models. These methodologies take a large number of samples of size n (n is the original sample size) from the data, computing the indirect effect in each sample and then deriving a confidence interval. Bootstrapping is used to determine the significance of an indirect effect and is especially useful in small samples (MacKinnon et al. 2002).

One thousand bootstrap samples were created with the bias-corrected method. This method produces more accurate confidence intervals with small samples (Shrout & Bolger, 2002).

6.3 Results

6.3.1 Exploring the Mediation Model for Threat-Related Cognitive Biases

In this section it is explored whether the ABs towards angry faces observed for the older group of children could be a mediator between maternal variables and the child´s levels of separation anxiety. Because a trend in the data (see Chapter 4) suggested that older children with heightened levels of separation anxiety could show an ABs towards neutral faces the possible mediating role of these biases were also explored.

6.3.1.1. Are threat-related ABs towards angry or neutral faces a mediator between maternal depression and the child's separation anxiety?

The first mediation model proposed examines whether ABs towards angry faces could mediate the link between maternal depression and the child's separation anxiety. See Figure 11.
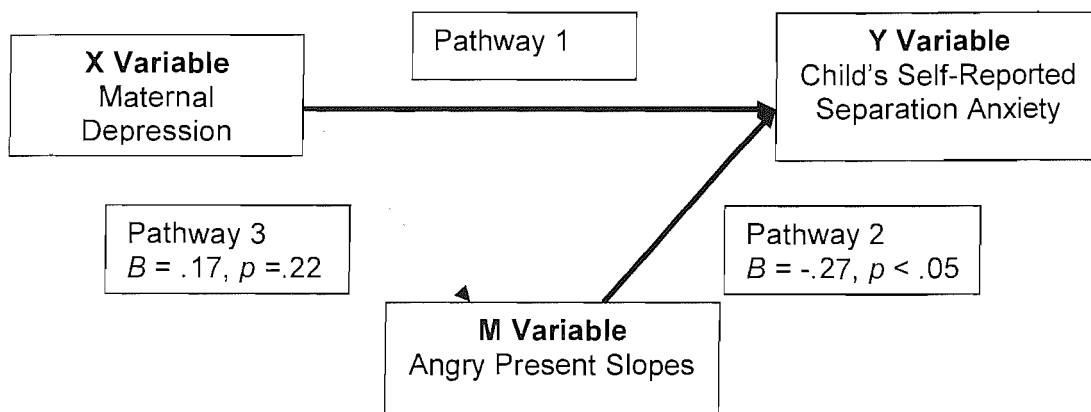
Figure 11. A proposed mediation model in which angry present slopes would be mediating the link between maternal depression and a child's separation anxiety

Regarding pathway 1, the link between maternal depression and the child's separation anxiety has consistently been outlined in the literature (Biederman et al. 2001; Kearney et al. 2003). Results in Chapter 5 confirm the association.

Regarding pathway 2 a linear regression analysis gave further evidence for the link between threat-related ABs towards angry faces and separation anxiety in older children (B = -.27, p < .05).

Nevertheless little evidence was found for pathway 3. Maternal depression did not predict angry present slopes (B = .17, p =.22). This result does not lend credence for the mediation model 1.

In the second mediation model proposed it was examined whether threat-related ABs towards neutral faces could be mediating the

relationship between maternal depression and the child' separation anxiety. See Figure 12.
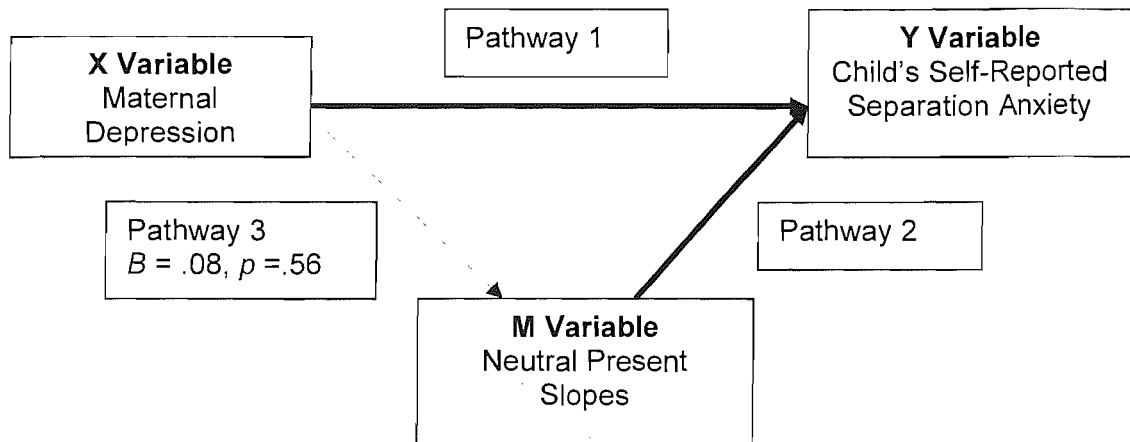
Figure 12. A proposed mediation model in which neutral present slopes would be mediating the link between maternal depression and the child's separation anxiety

Pathway 3 was the first to be examined as little evidence for a link between maternal depression and angry present slopes had been observed in the previous model. Again maternal depression was found not to predict neutral present slopes (B = .08, p = .56). Thus, this proposed mediation model was also discarded.

The results suggest that threat-related ABs towards angry or neutral faces would not be mediating the relationship between maternal depression and the child's separation anxiety.

6.3.1.1.1 A further analysis on the role of threat-related ABs in the maternal depression-child's anxiety linkage

This analysis was conducted based on empirical work that suggests that depression can have a cancelling effect on vigilance to threat (Taghavi et al. 1999, Dalgleish et al. 2003) .

Based on the above mentioned empirical work and on the feasibility of modelling as another mechanism of transmission of anxiety to the child, an alternative model is proposed. In this model threat-related ABs would

not be a mediator in the relationship between maternal depression and the child's separation anxiety but they would be a moderator, influencing the relationship.

For the analyses, data from the older and the younger children was used as the association between maternal depression and the child's separation anxiety was found to be consistently independent of the age of the child (See Chapter 5).

Four moderation models were designed with AMOS 6.0. The missing data was replaced with the means. This procedure was considered appropriate as the missing data was less than 10%. The treatment of missing data was carried out so bootstrapping could be applied.

In the first two models the moderating effect of vigilance or avoidance of angry faces on the relationship between maternal depression and the child's separation anxiety was examined. Due to the consistent link found throughout the thesis between maternal depression and the child's separation anxiety (both as reported by the mother and the child), a combined variable including both informants was computed for separation anxiety. The possible moderating effect of vigilance or avoidance of threat was tested with a group comparison design. Two groups were defined with the angry present slopes variable. The group with scores below the median was the vigilance for threat group. In this group children had lower RTs and so they were faster in detecting threat. The group with scores above the median was the avoidance for threat group. In this group children had higher RTs and so they were slower in detecting threat. The Figure below depicts the proposed moderation model which was tested separately for both groups: the vigilant and the avoidant. In this model, boxes represent measured variables and circles represent error variances or residuals. The straight arrow represents a directional link between the observed variables.
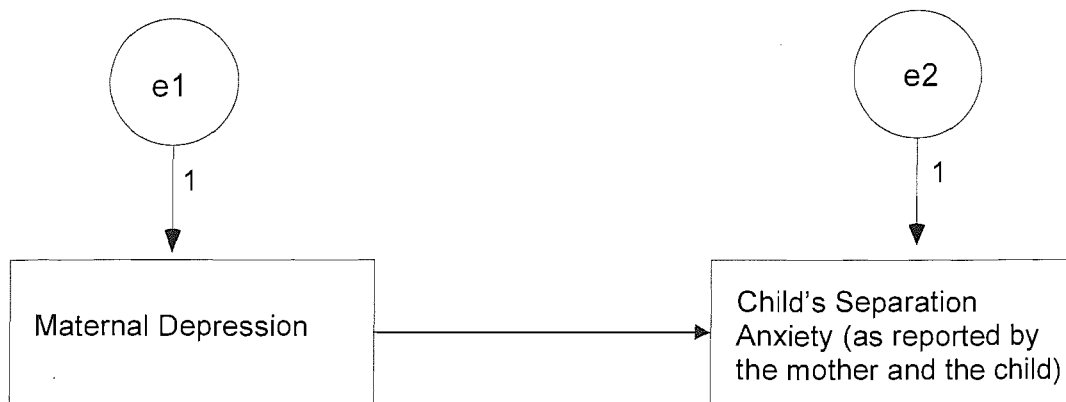
Figure 13. Proposed moderating model in which threat-related ABs would be influencing the strength of the association between maternal depression and a child's separation anxiety

The results suggested that threat-related ABs towards angry faces could be moderating the relationship between maternal depression and the child's separation anxiety. The association between maternal depression and the child's separation anxiety was stronger for avoidance of angry faces group (B =. 35, p < .01) compared to vigilance for angry faces group (B = .22, p < .05). See Table 33 for estimates and standard errors of the standardized direct effect and the bootstrap confidence intervals for the effect.

Table 33

Standard estimates, standard errors and bootstrap confidence intervals of the moderating effect of angry related ABs

Effect	Estimate	*SE*	Bootstrap Confidence Intervals
Avoidance	0.35	0.20	(0.12, 0.53)
Vigilance	0.22	0.28	(0.008, 0.41)

In the last two models the moderating effect of vigilance or avoidance of neutral faces was examined following the same procedure as for angry faces. In line with the previous findings, the association between maternal depression and the child's separation anxiety was stronger for avoidance of neutral faces group (B = .38, p < .01) compared to vigilance for neutral faces group (B = .23, p < .05). The child's separation anxiety variable was once more a combination of maternal and child reports of separation anxiety. See Table 34 for estimates and standard errors of the direct effect and the bootstrap confidence intervals for the effect.

Table 34

Standard estimates, standard errors and bootstrap confidence intervals of the moderating effect of neutral related ABs

Effect	Estimate	*SE*	Bootstrap Confidence Intervals
Avoidance	0.38	0.18	(0.12, 0.57)
Vigilance	0.23	0.29	(0.009, 0.41)

All the four models were found to adequately fit the data. Their GFI value was above 0.90.

6.3.1.2. Do threat-related ABs mediate the influence of maternal overprotection over a child's separation anxiety?

The first key point to examine in order to answer this question is addressed in the following section.

6.3.1.2.1 Are threat-related ABs towards angry faces a mediator between maternal overprotection and a child´s separation anxiety?

Exaggerated maternal praise towards the child as assessed by EE was indicative of maternal overprotection. Following the FMSS manual (Magana et al. 1996) maternal praise was coded as a binary variable (0 = four or less positive comments about the child, which indicate low maternal praise; 1= five or more positive comments which indicate exaggerated maternal praise).

Results in Chapter 5 showed little evidence for pathway 1. See Figure 14. Nevertheless based on the expected small effect size between maternal overprotection and a child's separation anxiety, it was deemed appropriate to test for a mediation model (Shrout & Bolger, 2002).Indeed the relationship between X and Y could be an indirect one. It could be explained by a mediating variable (M variable in Figure 14). The expected small effect size between X and Y is based on the literature (McLeod et al. 2007) and corroborated by the results obtained.
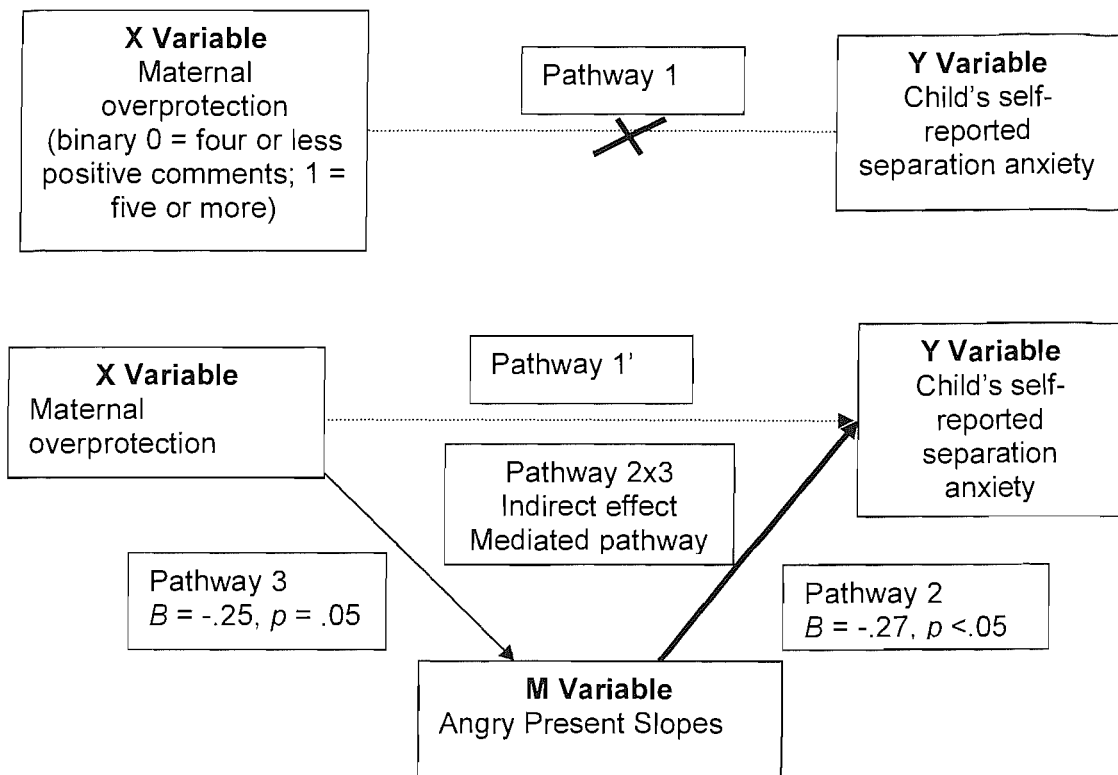
Figure 14. Proposed partially mediated pathway explaining the relationship between maternal overprotection and the child's self-reported separation anxiety

Evidence for pathway 2 had already been observed in the proposed mediation model 1.

Interestingly a linear regression analysis showed that the predictive value of exaggerated maternal praise for angry present slopes approached significance (B = -.25, p = .05). Because pathway 3 approached significance the mediation model was tested with SEM using AMOS 6.0.

Firstly the fit of the mediation model 3 was evaluated. Following convention (Hancock & Mueller, 2006), model 3 was judged as providing reasonable fit to the data. The goodness-of-fit index (GFI) was above 0.90. No values for chi-square index were obtained for this model or the following ones because all these models were just identified. Only 5 cases in the EE maternal praise variable were missing out of the complete data set for the older group of children (N = 60). They were replaced by the mean. Missing data was replaced by the mean so bootstrapping could be applied.

See Table 35 for estimates and standard errors of standardized direct and indirect effects and the bootstrap confidence intervals for each of the effects.

Table 35

Standard estimates, standard errors and bootstrap confidence intervals of the direct and mediating effect of angry related ABs

Effect	Estimate	SE	Bootstrap Confidence Intervals
Pathway 1	-0.11	0.12	(-0.33, 0.08)
Pathway 2	-0.31	0.13	(-0.56, -0.01)
Pathway 3	-0.25	0.11	(-0.46, -0.01)
Pathway 2x3	0.07	0.04	(0.007, 0.20)
Pathway 1'	-0.19	0.12	(-0.44, 0.04)

In order to interpret the data, the standard estimates (which are the standard regression coefficients) for pathways 2 and 3 and for the indirect pathway (pathway 2 x pathway 3) were taken into consideration together with their p value. In Figure 15 the standard estimates are displayed. The significant pathways are given in bold. In this Figure, boxes represent measured variables and circles represent error variances. Following Shrout and Bolger (2002) recommendations bootstrap confidence intervals were considered as additional information to the significance of the pathway explored.
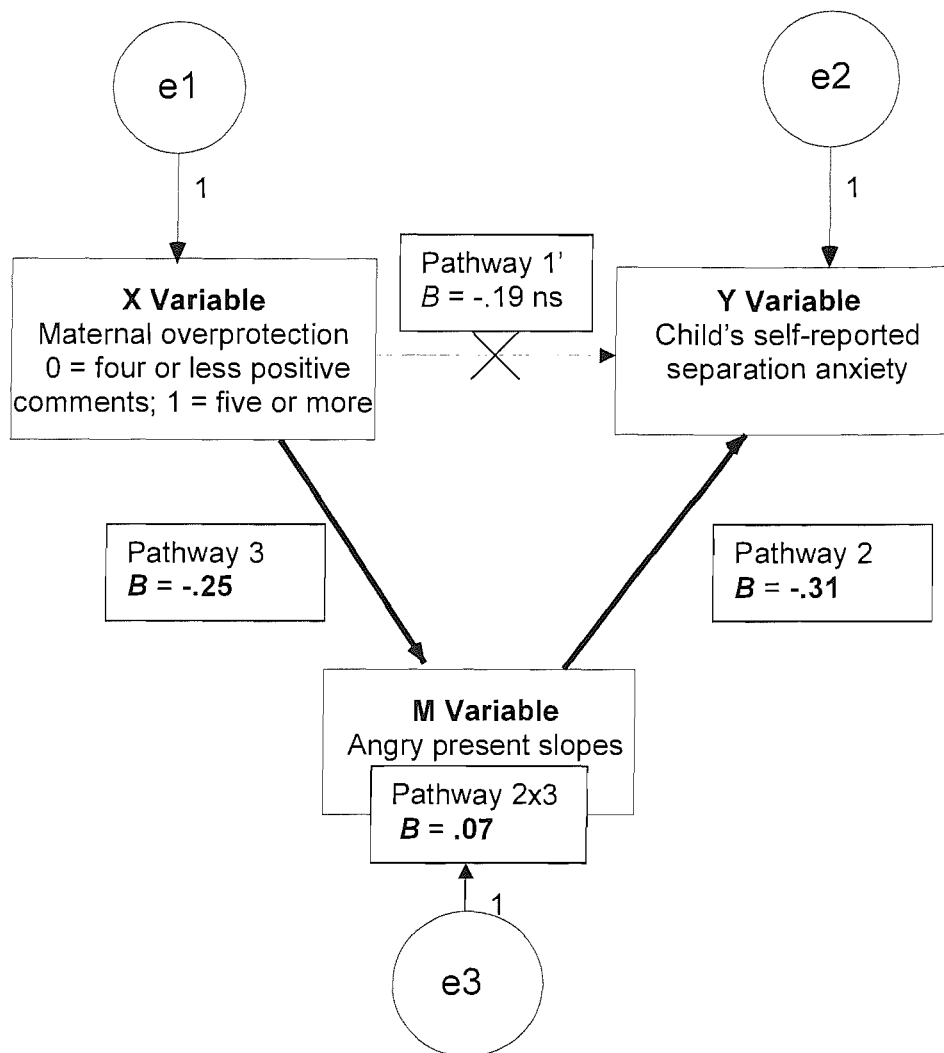
Figure 15. Path model showing partial mediation of a threat-related AB towards angry faces

As can be seen in the previous Figure, exaggerated maternal praise (five or more positive comments) led to a faster RT in angry present slopes. Hence exaggerated maternal praise led to vigilance to threat. Vigilance to threat led in turn to higher levels of self-reported separation anxiety in the child. This finding adds to recent empirical work (Wood 2006). In addition this finding adds to the hypothesis that posited that maternal overprotection would be related to separation anxiety in the child. Following the bias-corrected percentile method the *p* values of the standard regression

coefficients for both pathway 2 and 3 were found significant (p < .05). Corroborating the results in Chapter 5, the direct pathway linking maternal overprotection with a child's separation anxiety was found not significant (B = -.11, p =. 39). When the mediator was introduced in the analysis the strength of the maternal overprotection-child's separation anxiety linkage changed although it remained not significant (B = -.19, p = .11). This change was significant as indicated by the p value of the indirect pathway: pathway 2 x pathway 3 (B = .07 p < .05). The significant change when the mediator was introduced in the analyses is indicative of a partially cognitive mediated pathway. In this pathway exaggerated maternal praise would be enhancing vigilance for angry faces and vigilance for angry faces would be augmenting the levels of separation anxiety in the offspring.

6.3.1.2.2 Are threat-related ABs towards neutral faces a mediator between maternal overprotection and the child's separation anxiety?

In order to be able to test for this model pathway 3 and 2 had to be significant. See Figure 16. A linear regression analysis showed that exaggerated maternal praise was predicting neutral present slopes (B = -.25, p < .05). Therefore pathway 3 was corroborated. Another linear regression analysis showed a trend indicative of the potential predictive value of neutral present slopes for the child's separation anxiety (B = .-26, p = .09). This trend in pathway 2 was interesting enough to further explore the mediation model with SEM. See Table 36 for estimates and standard errors of standardized direct and indirect effects and the bootstrap confidence intervals for each of the effects.

Table 36

Standard estimates, standard errors and bootstrap confidence intervals of the direct and mediating effect of neutral related ABs

Effect	Estimate	SE	Bootstrap Confidence Intervals
Pathway 1	-0.11	0.12	(-0.33, 0.08)
Pathway 2	-0.26	0.12	(-0.48, 0.00)
Pathway 3	-0.25	0.12	(-0.49, -0.01)
Pathway 2x3	0.06	0.04	(0.007, 0.20)
Pathway 1'	-0.18	0.13	(-0.43, 0.08)

In Figure 16 the standard estimates are displayed. The significant pathways are given in bold. Boxes in the figure represent measured variables and circles represent error variances.
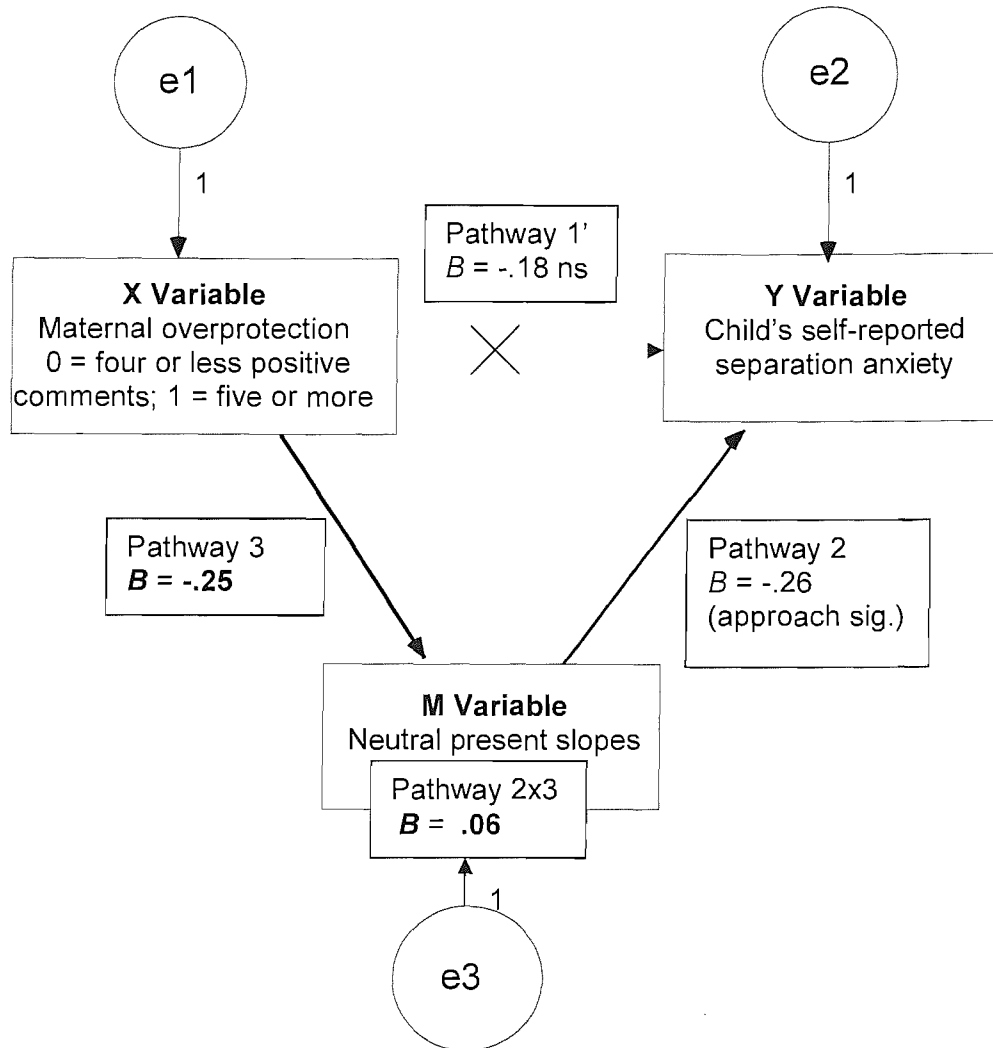
Figure 16. Path model showing partial mediation of a threat-related AB towards neutral faces

The model was found to adequately fit the data (GFI = 1). Following the bias-corrected percentile method pathway 3 was found significant ($B = -.25$, $p < .05$).This result indicated that exaggerated maternal praise was enhancing vigilance for neutral faces. In addition pathway 2, in which vigilance for neutral faces would enhance the child's separation anxiety, approached significance ($B = -.26$, $p = .05$). Like in the previous model when the mediator was introduced in the analysis the strength of the maternal overprotection-child's separation anxiety linkage changed. The Beta value augmented, from $B = -.11$, $p = .39$ it changed to $B = -.18$,

p = .16. This change was significant as indicated by the *p* value of the indirect pathway :pathway 2 x pathway 3 (*B* = .06 *p* < .05). The significant change when the mediator was introduced in the analyses is indicative of a partially cognitive mediated pathway. In this pathway exaggerated maternal praise would be enhancing vigilance for neutral faces and this AB would contributing in turn to the levels of separation anxiety in the offspring.

6.3.1.3. Are threat-related ABs towards angry or neutral faces a mediator between an unfavourable mother-child emotional relationship and the child's separation anxiety?

Little evidence for pathway 1 had been observed in the results (see Chapter 5). The literature confirms the weak association between the X and Y variable (Mc Carty & Weisz, 2002). To test for a possible mediation model and following Shrout and Bolger (2002) guidelines, an exploration of pathway 3 and pathway 2 was carried out. See Figure below.
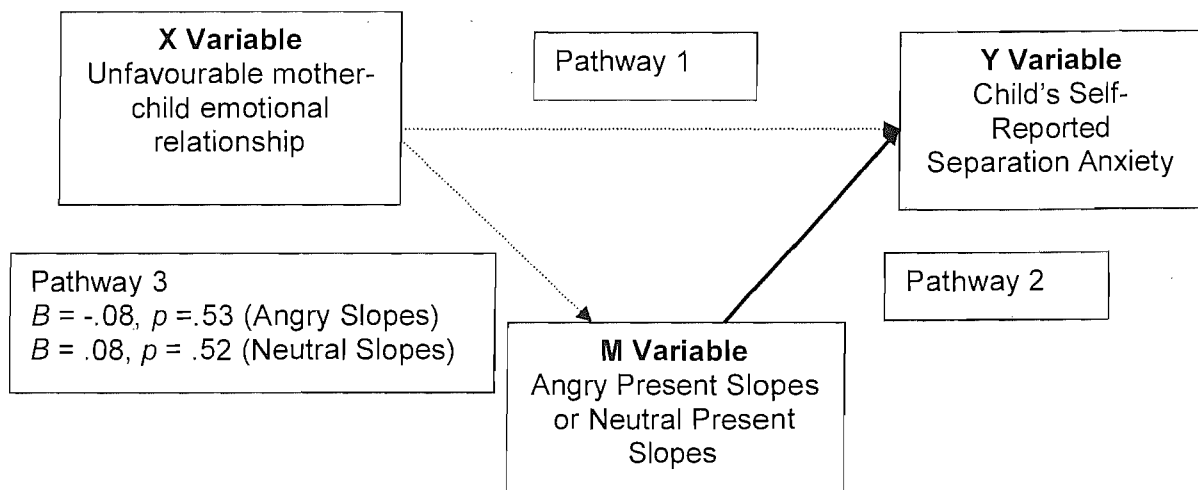
Figure 17. A proposed mediation model in which ABs towards angry or neutral faces would be mediating the potential link between a mother-child relationship and a child's separation anxiety

Results in the previous models give evidence for a link between angry or neutral present slopes and the child's separation anxiety (Pathway 2).

Thus, pathway 3 was examined. Two linear regression analyses showed that an unfavourable mother-child emotional relationship did not predict angry present slopes (B = -.08, p = .53) nor it predicted neutral present slopes (B = .08, p = .52).Therefore the mediation model was not supported.

6.3.2 Exploring the Mediation Model for Threat-Related Interpretive Biases

The feasibility of a model in which anxious-related interpretive biases could be a mediator between maternal childrearing practices and maternal depression and a child's separation anxiety was also tested. Results in Chapter 4 give evidence to support a pathway that would link an interpretive bias towards social and separation anxious scenarios and maternal reports of the child's separation anxiety (pathway 2 in Figure 18). Interestingly age appeared not to be a moderator of this link. Thus in testing the model data from both young and old children was included.
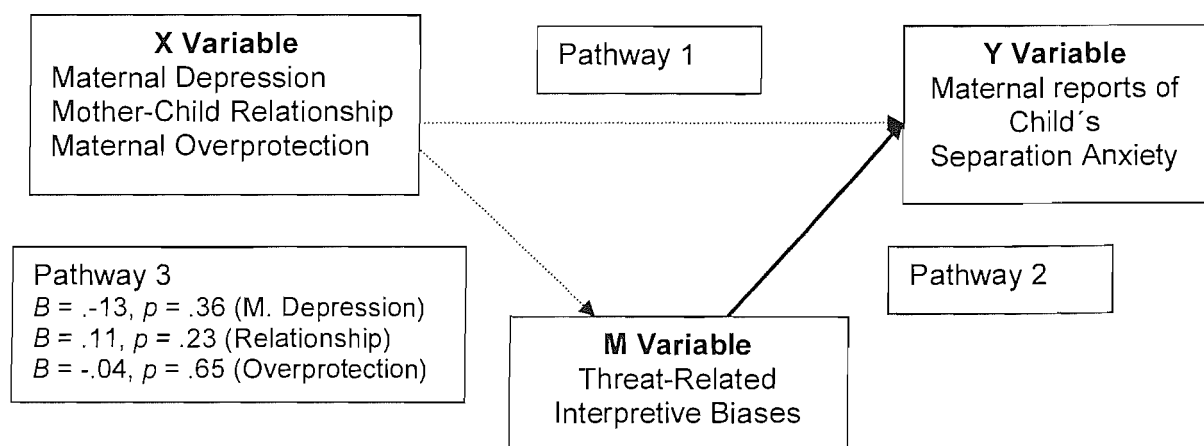
Figure 18. The three pathways to explore the threat-related interpretive bias model

Pathway 3 was examined first. Three linear regression analyses were conducted. It was found that maternal depression did not significantly predict interpretive biases towards social and separation anxious scenarios (B = .-13 p = .36). Neither a mother-child emotional relationship (B = .11, p = .23) nor maternal overprotection (B = -.04, p = .65) had a significant

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predictive value over the anxious-related interpretive biases.Therefore this mediation model could not be further tested.

6.4 Conclusion

When exploring mechanisms of transmission of anxiety from the mother to the child a partially cognitive mediated pathway was found. Interestingly in this pathway exaggerated maternal praise towards the offspring (an indicator of maternal overprotection) was impinging on a child's vigilance of threat. Vigilance of threat was in turn augmenting the child's levels of separation anxiety. However the possibility that other mechanisms such as modelling could also be playing a role in the communication of anxiety from the mother to the child is also supported by the data. Indeed ABs towards threat appeared not to mediate the link between maternal depression and a child's separation anxiety. Moreover, little evidence for a model in which anxious-related interpretive biases would be mediating the relationship between maternal childrearing practices or psychopathology and separation anxiety in the offspring was found.

In the following chapter this pattern of results are discussed. The limitations of the study and future avenues of research are also considered.

CHAPTER 7

General Discussion

7.1 Introduction

The aims of this thesis were threefold: (1) To investigate cognitive biases and childhood anxiety; (2) To investigate family factors and childhood anxiety; (3) To explore maternal mechanisms of transmission of anxiety onto the child. Following Rapee's (2001) model the feasibility of a cognitive mediated pathway was explored.

In order to give a clear structure to the discussion of the work presented, this section will be divided following the aims of the thesis.

7.2 Cognitive biases and childhood anxiety

7.2.1 Threat-related ABs and childhood anxiety

7.2.1.1 Introduction to the main findings

Before addressing the main findings on anxious-related ABs, the psychometric properties of the attentional tasks used for capturing these biases are referred to.

The Visual Search Task (VST) was found to be a sensitive methodology for capturing attentional processes in anxious children. In contrast with the MDPT and in line with developmental theories, the VST showed that anxious-related ABs were dependant on age-related effects .

The psychometric value of the MDPT used in the thesis could be put in doubt by the fact that children did not detect the dot probes on the condition in which the threatening stimuli appeared in the vicinity of the dot probe more quickly than on the condition in which it did not (Waters et al. 2004). Moreover in opposition with previous work with children that

employed facial stimuli, only a trend in the data indicated that high trait anxious children could be exhibiting an AB towards pictorial stimuli that depicted general worries (Monk et al. 2006).

Despite more work on attentional tasks tapping into ABs in anxious children is needed, with the VST it was observed that children with separation anxiety aged over 10 years exhibited a threat-related AB. These findings reinforce the value of taking a developmental approach when investigating ABs and childhood anxiety (Lonigan et al.2001, 2004; Kindt & van den Hout, 2001).

7.2.1.2 The Nature of Threat-Related ABs

7.2.1.2.1 The Specificity of Threat-Related ABs

The findings in the thesis add to existing empirical work by demonstrating that older children with self-reported symptoms of separation anxiety have a threat-related AB specific to their anxious symptomatology. These children showed an AB favouring potential social threats, specifically they showed an AB towards angry faces.

Research looking at ABs specific to a social or separation anxious symptomatology is very much in its infancy. Some pioneering work on specificity of ABs in children was conducted by Vasey et al. (1996). The researchers measured attentional response times to social and physical threat-related words for high and low test anxious children with a DPT. High test anxious children were found to respond more rapidly to cues following threatening words compared to low test anxious children. The findings in this thesis extend Vasey's et al. (1996) work to show specificity to threat-related ABs. Evidence of specificity to social anxiety has also been found in adults both with a visual search paradigm (Gilboa-Schetchman, 1999) and a dot probe paradigm (Mogg & Bradley, 2002, Garner et al. 2006). No research to date has looked at ABs specific to separation anxiety in adults. Only one study has explored ABs specific to separation and social anxiety

in the child's domain (Stirling et al. 2006). The researchers found a trend in their data suggestive of an AB away from faces depicting anger and fear in separation anxious children. An avoidance of these faces significantly emerged for socially anxious children. The work in this thesis extends Stirling et al.'s (2006) findings. Nevertheless in contrast with Stirling's and colleagues findings, in the thesis an AB towards and not away angry faces was observed for separation anxious children. The directionality of anxious-related ABs is addressed in this section. In addition an anxious-related AB did not significantly emerge for children with social anxiety. A possible explanation of this latter finding is given in the following subsection.

As a concluding note on the nature of the threat-related ABs exhibited by separation anxious children, the results in the thesis put forth the argument that depression in the child could diminish the emergence of a child's anxious-related AB (Mogg et al. 1993; Bradley et al. 1995). Indeed when controlling for the effects that depression in the child (as reported by himself and the mother) had on the child's self-reported separation anxiety, the child's angry present slopes explained an additional 9% and 4 % respectively of the variance in separation anxiety scores.

Children with high levels of state anxiety were found to have a tendency for attending to threatening pictures with the MDPT. This tendency was however not significant and in opposition with adult research, state anxiety did not interact with trait anxiety to enhance a child's anxious-related AB (Williams et al. 1988; MacLeod & Mathews, 1988).These findings and the fact that children high in trait anxiety were found not to significantly exhibit a threat-related AB towards pictorial stimuli could be explained by the methodology used. Indeed as mentioned in the introductory section the pre-analyses of the MDPT showed a pattern of results that compromises the psychometric value of the task. Further research should refine this task. For example pictorial stimuli appraised by the children as highly threatening should be used (Waters et al. 2004).

7.2.1.2.2 Why no threat-related ABs were observed for socially anxious children?

Based on recent empirical work it was hypothesised that children high in social anxiety would attend to angry and neutral faces (Stirling et al. 2006; Cooney et al. 2006). Nevertheless the findings in the thesis did not corroborate this hypothesis. A study looking at children's discrimination of expressions of emotions provides a theoretical explanation of why no threat-related ABs were observed for socially anxious children (Battaglia et al. 2004). In this study it was observed that non-referred socially anxious children specifically misidentified expressions of anger. An expression of anger was almost exclusively classified as an expression of disgust. The emotional expressions presented to the children consisted of facial expressions of a boy and a girl who were the same age as the children in the study (mean age 7.5). In light of these results it was suggested that a child's ability to accurately identify other children's emotions was partially linked to their levels of social anxiety. This argument is supported by some research that has documented that early life adversities can alter the way individuals process specific emotions (Pollak, Cicchetti, Hornung & Reed, 2000; Pollak & Sinha, 2002). In order to give a theoretical explanation of their findings, Battaglia et al. (2004) argued that for children high in social anxiety the most feared situations would be situations of rejection and teasing from peers. The authors added that these situations are more closely linked to expressions of disgust than to expressions of anger. Based on Battaglia's et al. (2004) theoretical explanation it could be argued that misinterpretations underlying angry faces could have counteracted the potential bias favouring these faces. It would be interesting to include emotional faces expressing disgust in future experimental paradigms to explore ABs in socially anxious children.

Complementary to this argument is the finding obtained by Horley, Williams, Gonsalvez and Gordon (2004). With an eye movement paradigm they found that socially anxious individuals exhibited reduced foveal fixations of the eyes when presented with facial expressions. This reduced foveal fixation was particularly evident for angry faces. Based on this result

and bearing in mind Battaglia's et al. (2004) findings it could be argued that children with social anxiety would be placing less attentional processes to the area of the eyes on the angry faces, which would augment the likelihood of facial misinterpretation. Indeed in line with research on cognitive models of visual processing, the eyes are an important feature in the processing of schematic faces (Schwarzer & Zauner, 2003; Tipples 2007).

The work by Battaglia et al. (2004) also sheds light on mechanisms that could be underlying vigilance of neutral faces in socially anxious children. They found that socially anxious children not only misinterpreted angry facial expressions but they also misinterpreted neutral facial expressions. In 32% of the cases children misclassified a neutral face of a girl as an expression of sadness.

Despite Cooney's et al. findings (2006) gave grounds for arguing that socially anxious adults have a neural basis for a biased processing of ambiguous social stimuli (neutral faces), in their study participants experiencing social anxiety together with depression were excluded from the sample. Hence because the participants were only experiencing social anxiety the potential cancelling effects of depression on vigilance to ambiguous threatening stimuli would have not occurred.

Further research exploring processing biases towards or away from angry and neutral faces in socially anxious children is merited. In fact only one study to date has shown that non-referred socially anxious children exhibit an AB away from angry and fearful facial expressions (Stirling et al. 2006). The findings of this study are only preliminary in nature.

A question that arises at this point is do different attentional mechanisms to threat apply to social and separation anxiety despite the similarity of the anxiety constructs? This question will be addressed in the following paragraphs.

A possible explanation can be found in the determinants of joy and fear when processing facial expressions put forth by Sroufe (1996). He argued that face schemes become differentiated by 4 to 5 months old. In other words infants of that age selectively smile to highly familiar faces. He added that if an infant was distressed by strangers (as it would happen if the infant had separation anxiety) the infant threshold for threat would be lowered. In line with Sroufe's (1996) argument, Mogg and Bradley (1998) in their Cognitive Motivational Model (CMM) proposed that if a children's valence evaluation system tagged a stimulus as high in threat value, his/her goal engagement system would determine the allocation of processing resources towards strange non-familiar faces. Children with separation anxiety could then be attending to potentially threatening facial cues. Hence Sroufe's explanation on facial processing (1996) and Mogg and Bradley's (1998) CMM model can serve to explain why a separation anxious child would exhibit vigilance for threatening faces.

But, why would misinterpretation of angry faces not be counteracting the bias towards these faces for separation anxious children as it appeared to be doing so for socially anxious children?. A hypothesis based on the accumulative effects of limited social encounters on a child's beliefs of social skills could be put forth. Overtime children with separation anxiety could limit their social encounters, as they have intense fear of separation from the caretaking figure (Casat, 1988;Masi et al. 2001;Jurbergs & Ledley, 2005). This could have a detrimental effect on their beliefs regarding their social skills, heightening their levels of social anxiety (Cartwright-Hatton, et al. 2005). Due to the misjudgement of their social skills children with heightened social anxiety could be prone to misinterpret external social cues, for example they could interpret an angry face as a disgust face (Battaglia et al. 2004). It would be interesting to address this hypothesis with a longitudinal design and with the inclusion of adolescents in the sample, as social anxiety reaches a high prevalence rate in adolescence (Ollendick & Hirshfeld-Becker, 2002).

No conclusive findings can be yet outlined on attentional mechanisms to threat underpinning separation and social anxiety in childhood. Taking together the current literature and the pattern of results found, these attentional mechanisms could be different for separation and social anxiety. Separation anxious children would be prone to attend to potentially threatening social cues. Socially anxious children would be prone to misinterpret potentially threatening social cues (Rapee & Heimberg, 1997, Battaglia et al. 2004). Thus their attentional mechanisms favouring threat could be cancelled out by these misinterpretations. According to adult models of social phobia, vigilant (Rapee & Heimberg, 1997) and avoidant processes (Rapee & Heimberg, 1997; Clark & Wells, 1995) could be playing a role in the generation and maintenance of anxiety in social situations.

7.2.1.2.3 The Directionality of Threat-related ABs

Studies on separation/social anxiety and ABs towards or away from emotional faces are very much in their infancy and whether vigilance or avoidance for threat-related facial expressions would be observed is not a clear-cut conclusion. Similarly adult models on information processing mechanisms related to social phobia have not reached a conclusion on the directionality of the effect. According to Rapee and Heimberg's (1997) cognitive model of social phobia in adults, socially anxious individuals would be expected to show vigilance and avoidance of threat-related cues. According to Clark and Wells's (1995) cognitive model of social phobia, adults with social anxiety would show avoidance of threat-related cues. Unfortunately cognitive models of social phobia in children have not yet been developed although initial attempts have been made in developing a model on the aetiology of social phobia considering cognitive factors (Rapee & Spence 2004). A model explanatory of the aetiology of separation anxiety is also needed.

One hypothesis put forth by Chen et al. (2002) on the role that contingencies of experimental paradigms can have regarding threat-related ABs in social anxiety should be considered. They hypothesised that

whenever the experimental task allowed patients with social anxiety to freely allocate their attention to the threatening stimulus or to divert their attention from it, patients would exhibit an avoidance effect. In contrast, whenever the experimental task constrained patients' attention allocation via asking them to search for the threatening stimulus, they would exhibit a vigilance effect. This last case is the experimental contingency of the VST employed in the thesis. Thus a beneficial line of research would be to explore whether the vigilance-effect observed is dependant on the characteristics of the VST employed. Future research should explore strategic biases in attention allocation in socially anxious children using experimental paradigms with different contingencies.

Interestingly adult literature on anxiety an attentional processing argue in favour of a vigilance-avoidance hypothesis in which both ABs towards or away from threat could emerge depending on the time course in the processing of the stimuli or on evaluation mechanisms of threat value (Calvo & Avero, 2005; Mogg & Bradley 1998). Calvo and Avero (2005) demonstrated that high trait anxious individuals exhibited an AB towards emotional stimuli during the first 500ms following onset of the stimuli and an AB away from these stimuli during the last 1000ms of stimuli exposure. In addition in Mogg and Bradley's (1998) cognitive motivational model it is proposed that there should be no ABs for emotional stimuli with no threat value. An AB would emerge for stimuli appraised as threatening. However when stimuli were appraised as low in subjective threat value there would be a tendency to direct the attention away from them. This tendency could be useful for maintaining a positive mood and for maintaining the attention on currents goals.

7.2.1.3 A developmental approach on threat-related ABs and anxiety in the child.

In consistency with developmental theories, a threat-related AB for separation anxiety was only observed for the older group of children (aged over 10 years). It should be noted that age appeared to be a moderator in the relationship between these anxious-related ABs and separation anxiety in the child, therefore it was deemed appropriate to examine ABs separately in two age groups (children aged over 10 years and children aged 10 years or below). This age split was based on the theoretical framework of Kindt and van den Hout (2001) and on previous empirical work (Kindt et al. 2003).

The fact that only children aged over 10 showed an AB towards threat is suggestive of a critical period in the emergence of anxious-related ABs. In this critical period, a failure to acquire certain cognitive skills could place the child at risk of developing an anxious symptomatology. Effortful control (EC) also termed as inhibitory control is a cognitive skill that has been identified as crucial in the development of childhood anxiety (Kindt & van den Hout 2001; Lonigan et al. 2004). EC involves a variety of capacities that contribute to the regulation of attentional processes (Eisenberg et al. 2005). Thus EC is inherently related to attentional control. Interestingly several researchers highlight the age of 10 years as a critical maturational period in which a child would start to exhibit mastery in inhibitory control skills. For example Williams, Ponesse, Schachar, Logan and Tannock (1999) examined the development of inhibitory control with a large group of participants (275) aged 6 to 81 years. They used a stop-signal procedure in which the subject was asked to press the button labelled with an X when the uppercase letter X appeared on the screen. They were also asked to press the button labelled with an O when the uppercase letter O appeared on the screen. Both letters were presented at the centre of the screen for 1000ms. The individuals, however, were asked to inhibit their responses when they heard a stop signal. The pattern of

results found in the study showed that young children (mean age 7.5 years) were approximately 50 ms slower in stopping than the older group of children (mean age 11.1 years). Young adults (18 to 29 years old) were also found about 20ms faster than the oldest group of adults (60 to 81 years old).

The researchers concluded that these age-related changes in stop-signal reaction time provide evidence of significant improvements in the ability to inhibit a course of action throughout childhood but little change throughout adulthood. Indeed older adults were only 20 ms slower at stopping than younger adults. Previous researchers had already documented a similar magnitude in the observed difference in inhibitory control skills between early and middle childhood. Schachar and Logan (1990) with a similar stop-signal paradigm found that children aged approximately 10 years (mean age 9.8) were about 50 ms faster in stopping than younger children (mean age 7.9). The fact that both Williams et al. (1999) and Schachar and Logan (1990) work show a remarkable improvement of inhibitory control skills for children aged 10 years or above, suggests a critical age period in which inhibitory control skills could stop a child's general proneness to attend to threat. Further corroboration of the importance of this age period in the acquisition of inhibitory control skills that would attenuate a child's attentional proneness to threat comes from a study by Rueda, Posner and Rothbart (2004). They developed an attention network task (ANT) specifically for children. This ANT included the three networks that have been found related to different aspects of attention: (1) Alerting: defined as achieving and maintaining a state of high sensitivity to incoming stimuli; (2) Orienting: defined as the selection of information from incoming stimuli; (3) Executive control: involves the mechanisms for monitoring and resolving conflict among thoughts, feelings and responses.

Using child ANT they found differences in the development of the attentional networks between 6 and 10 year-old children and from this period to adulthood. Alerting and orienting are the two networks relevant to the attentional processes investigated in this thesis. Indeed in the visual

search and in the dot probe paradigm employed, the individual was required to achieve and maintain a state of high sensitivity to different stimuli (alerting network). In the VST the individual was asked to look for an emotional face or a neutral face, whereas in the DPT the individual was asked to detect the colour of the dot that could appear in the vicinity of threatening stimuli. In addition in the VST the individual had to select information from the faces and distractors presented when searching for a target face (orienting network). In the DPT the individual had also to select information from incoming stimuli in order to detect the colour of the dot.

The results found by Rueda et al. (2004) indicated no age-related changes for the orienting network, however an alerting effect was found. The researchers found that a decline in the alerting network occurred from 10 year olds to adults. This finding suggests that a state of high sensitivity to incoming stimuli should decrease around the age of 10 years. Based on this finding and in conformity with Kindt and van den Hout's (2001) and Kindt's et al. (2003) work it could be hypothesised that the continuation of high activity in the alerting network after 10 years could place a child at risk of developing an AD. A child prone to anxiety would have a high sensitivity to threat-related stimuli. A prolonged alertness towards these stimuli would enhance a child's bias to threat augmenting the child's anxiety levels.

The value of the above mentioned research is on the identification of a critical age in which cognitive maturation (of EC skills or of the alerting network) could be protecting the child with an anxious predisposition from ABs to threat. Nevertheless in order to gain a full understanding of the maturation of attentional networks and EC skills, work on the neurophysiology underlying these attentional processes is needed. In addition, when further investigating a critical age for the emergence of threat-related ABs, the methodological design of the studies should be considered. Researchers have argued that certain methodologies are more likely to overtax a child's cognitive abilities (Vasey & McLeod, 2001; Vasey et al. 2003). In line with this argument a recent study that was successful in tracing an interference effect with a EST in young anxious children (aged 7

to 10 years) attributed to the gentleness of the stimuli employed the AB observed. In this study drawing of faces depicting friendly and threatening expressions were used (Heim-Dreger et al. 2006). The authors suggested that the moderate threatening value of these pictures would not have overtaxed young children's limited capacity to inhibit the attention to these stimuli.

It should be noted that despite the VST is not an inhibitory task, it demands from the child to be alert to incoming stimuli. Interestingly as mentioned earlier, the alerting network is subject to age-related changes (Rueda et al. 2004). Thus, based on the above mentioned literature future research should address whether the VST overtaxes young children's cognitive skills. Indeed to determine the cognitive load that a specific experimental paradigm places on the child is crucial to understand the time course of ABs favouring threat (Vasey & McLeod, 2001)

7.2.2 Threat- related interpretive biases and childhood anxiety

The findings in the thesis give evidence for specificity in threat-related interpretive bias. Indeed a negative interpretive bias for stories depicting separation and social anxious concerns was only found in children with high levels of separation anxiety (as reported by the mother).

For Study 1 only stories tapping into physical and social anxious concerns were included. Despite the fact that these stories did not specifically tap into separation anxious concerns, a threat-related interpretive bias for children with separation anxiety was observed. Children with high separation anxiety made more negative interpretations when confronted with a socially threatening story. It would have been expected for high socially anxious children to also exhibit an interpretation bias when confronted with a socially threatening scenario (Muris, Merckelbach et al. 2000). Such an interpretation bias was not observed for socially anxious children. As a result of this somewhat striking finding, the scenarios in the story task were modified for Study 2. Scenarios specifically depicting separation anxious concerns were included. In line with a cognitive

specificity hypothesis (Bögels & Snieder et al. 2003) a further analysis, that combined data from the story tasks in Study 1 and Study 2, showed that separation anxious children made more negative interpretations than their counterparts when confronted with stories depicting separation and social anxious concerns. In addition, children with separation anxiety did not show an interpretive bias towards stories tapping into social and panic concerns or social and generalised concerns.

A developmental approach was taken when investigating interpretative biases. In contrast to the results on threat-related ABs and anxiety in the child, little evidence for an age-related effect was found. Indeed age appeared not to moderate the relationship between interpretive biases and separation anxiety in the child. It is plausible that cognitive maturational processes acquired around the age of 10 are not playing such a crucial role in the emergence of interpretive biases as for the emergence of ABs. The viability of this argument is explained in the following paragraph.

It has been documented that from age 7 onwards children are increasingly able to infer cause-effect relationships and to anticipate potential negative outcomes (Muris, et al. 2002). In the story tasks children were required to apply both cognitive skills. For example in one of the stories of Study 2 they had to say what the main character in a story would think in a situation in which a cake that is being baked could be burnt, if baked for too long. The fact that children as young as seven can infer cause-effect relationships and can anticipate potential negative outcomes could explain why interpreting biases favouring threat were observed independently of the age of the child.

Further work should be done to replicate Muris et al. (2007) findings in which children's lack of attentional control skills were linked to anxious-related interpretive bias. If this link would be found the role that attentional control skills could play in the emergence of interpretive biases would be necessary to explore.

7.2.3 Interim Conclusion

Attentional biases towards angry faces and negative interpretive biases for stories depicting separaration and social worries were found in children with symptoms of separation anxiety. Anxious-related ABs were significantly observed for self-reports and not maternal reports of separation anxiety in the older group of children. As mentioned in the results section of Chapter 4, the low levels of separation anxiety as reported by the mother could account for this finding. In contrast threat-related interpretive biases significantly emerged with maternal reports of separation anxiety and not with child reports. Mothers have been found accurate in reporting their children's depression (Puura, et al. 1998) and anxiety symptoms (Kendall, et al. 2007). However the different results obtained for the mother and the child reports show the convenience of incorporating information from multiple informants (Kagan et al. 2002; De Los Reyes & Kazdin, 2005).

7.3 Family factors and childhood anxiety

Parental mental health and parental childrearing variables were the family factors explored in this thesis. The parental mental health variables examined were: (1) Maternal depression; (2) Maternal general levels of trait anxiety; (3) Maternal panic and phobic anxiety; The parental childrearing variables examined were: (1) Maternal parenting styles; (2) Mother-child emotional relationship; (3) Maternal overprotection.

The studies carried out for this thesis focused on maternal variables as no complete data sets from the fathers could be obtained.

The findings in the thesis give evidence for the argument that anxiety co-segregates within families (Manicavasagar et al. 2001; Woodruff-Borden et al. 2002; Merikangas et al. 2003). It is important to note that maternal childrearing variables were not as robustly linked to an anxious symptomatology in the child as maternal depression. To expand on this

finding the associations found between maternal childrearing variables and the child's anxiety are first described.

7.3.1 The Influence of Maternal Childrearing Variables on the Child's Anxiety

An accepting parenting style (an authoritative style) was found to be significantly associated with lower levels of self-reported trait and separation anxiety in the child. It should be noted that when maternal depression was controlled for this association no longer held. In addition maternal depression was found to be significantly linked to the mother's authoritative style and the child's levels of separation and trait anxiety. On the other hand when maternal trait anxiety was controlled for, the association between the mother's authoritative style and separation and trait anxiety in the child remained. This result implies that maternal trait anxiety did not have a significant influence on the relationship between an authoritative style and the child's separation and/or trait anxiety. In line with this finding empirical work suggests that the association between parental trait anxiety and childhood anxiety would only hold for clinically anxious parents (Bernstein et. al., 2004, Biederman et. al., 2001).

Little evidence was found for a link between an authoritarian parenting style and anxiety in the offspring. This latter finding could be explained by the methodology used for assessing parenting styles. The mothers were asked to answer the items in the Robinson's Parenting Styles and Dimensions questionnaire. Because this was a self-report measure, mothers could have under-reported their maladaptive parenting behaviour (Bögels &Brechman-Toussaint 2006). Future studies would benefit from including observational measures (McLeod et al. 2007). As a final note a reduced power in the analysis in parenting styles should be borne in mind.

An unfavourable mother-child emotional relationship was not significantly associated with a child's anxious symptomatology. Only low maternal praise was significantly positively associated with a child's social

anxiety. In line with this finding, neglectful parenting characterised by low warmth and low control has been linked to social anxiety (Morris 2001). Little evidence was found for a direct link between maternal overprotection and a child's separation anxiety. A finding discrepant with that of Wood (2006), but not with a recent review on parenting and childhood that concludes that the link between parenting variables and childhood anxiety would be especially weak for questionnaire studies (McLeod et al. 2007). One argument put forth by Wood et al. (2003) further explains why no significant direct link between maternal overprotection and a child's separation anxiety was found. The authors argued that parental warmth and parental control -a parenting dimension that includes parental overprotection- (Bögels & Brechman-Toussaint, 2006) would not be specifically linked to anxiety problems in children, but rather to risk for psychopathology in general. This argument reflects the concept of multifinality. This concept suggests that a single risk factor (such as parental overprotection) could lead to a variety of psychological disorders and not just to anxiety disorders depending on the context in which it runs (Wood et al. 2003).

One note on the failure to find evidence for an association between an unfavourable mother-child emotional relationship and a child's social or separation anxiety should be added. Empirical evidence suggests that an insecure mother-child attachment style could specifically augment the child's social and separation anxiety (Ollendick & Hirshfeld-Becker, 2002; Choate et al. 2005). Thus it would be worthwhile to further explore a mother-child emotional relationship focusing on attachment instead of on a EE index. The rationale for doing so is that a measurement of mother-child attachment is more likely to reflect a cumulative pattern of maladaptive interactions between the mother and the child than a measurement of EE. Indeed a measurement of mother-child attachment reflects a mother's-child relationship since early infancy (Bolwby, 1973). The importance of cumulative effects of family factors on the emergence of childhood anxiety has been documented in a recent cognitive-affective model on early family relationships and stress (Luecken et al. 2006). Measuring the mother-child

relationship with an EE index only allows tapping into the current relationship between the mother and the child. Specifically the length of time covered in the mother-child relationship assessed in this thesis is six months. This length of time was defined in the FMSS protocol used to measure the EE index.

One last comment on the association between maternal childrearing variables and a child's anxiety is that the strength of the association found across studies was between small and medium. In line with these findings the review on parenting and childhood anxiety by McLeod et al. (2007) reports a moderate association between parental childrearing variables and childhood anxiety.

7.3.2 The Influence of Maternal Mental Health Variables on the Child's Anxiety

7.3.2.1 The Influence of Maternal Panic/Phobic on the Child's Anxiety

Maternal panic and phobic anxiety were explored in their contribution to a child's separation anxious symptomatology. This line of research was undertaken based on Kearney's et al. (2003) and Bierderman's et al. (2001) empirical work that outlined a link between maternal panic and/or phobic anxiety and a child's separation anxiety. In line with these work findings in the thesis suggested that maternal depression was mediating the relationship between maternal panic anxiety and separation anxiety in the offspring. Further research is needed to ascertain the mediating role that depression can have in the relationship between maternal panic anxiety and separation anxiety in the offspring. Within this area of research Biederman et al. (2001) found that parental panic disorder individually or co-occurring with depression was associated with increased risk for separation anxiety in the offspring. Other researchers have outlined a link between pre-panic anxiety sensitivity in adolescents and vulnerability to develop a depressive symptomatology which could lead to severe panic attacks (Wilson & Hayward 2005). Panic attacks are a symptom of panic

anxiety; interestingly some literature suggests that separation anxiety precedes panic anxiety (Manicavasagar et al. 1998; Schneider & Nundel 2002).

Research on maternal panic anxiety and separation anxiety in the child is a fruitful one as it can inform about cognitive and family factors related to separation anxiety. Pioneering work in cognitive and family factors related to childhood anxiety has been conducted by Pine's et al. (2005a). In his work greater attentional allocation to fearful faces in offspring of panic disordered mothers has been observed.

7.3.2.2 The Influence of Maternal Depression on the Child's Anxiety

In contrast with the inconsistent association found between maternal childrearing variables and a child's separation anxiety support for a direct significant association between maternal depression and a child's separation anxiety was found. This association was found for maternal and child reports.The strength of it was between small and moderate.

Interestingly this association held independent of the age of the child, which suggests that maternal depression contributes to the continuation of a child's separation anxious symptomatology. Indeed symptoms of separation anxiety in the children should decrease in middle childhood (Bell-Dolan et. al., 1990; Costello et al. 2003). The influence of maternal depression on the continuation of a child's separation anxious symptomatology has been documented (Kearney et al.2003; Biederman et al. 2001).

7.4 Parental mechanisms of transmission of anxiety onto the child

The findings of this thesis highlight the importance of an environmental pathway explanatory of childhood anxiety. In this pathway fears and worries are acquired via learning processes that take place in the environment (Rachman, 1991; Field, 2006a). Specifically this thesis has narrowed down learning processes that occur within a family environment.

Firstly the pathways explaining how maternal childrearing variables could impinge on a child's separation anxiety will be discussed. Secondly the pathways explaining how maternal depression could be contributing to a child's separation anxiety will be discussed. It should be noted that none of these pathways are mutually exclusive.

7.4.1 Possible pathways to explain the influence of maternal childrearing variables on a child's separation anxiety.

Little evidence for a cognitive mediated model in which threat-related interpretive biases would act as a mediator between maternal childrearing practices and a child's separation anxiety was found. Future research should further explore the feasibility of this model, specifically using observational measures. These measures have been found more robust than self-report measures for assessing the parenting-childhood anxiety linkage (McLeod et al. 2007). A further examination of the possible mediating role of threat-related interpretive biases on the aforementioned linkage is supported by the literature. For example it has been found that a supportive parent-child relationship can reduce adolescents' appraisals of threat (Grych et al. 2004). In addition, in a prospective study it has been suggested that an early parent-child relationship could be a cause in the child's negative interpretations of story situations (Warren et al. 2004).

When the possible mediating role of threat-related ABs on the relationship between maternal childrearing practices and a child's separation anxiety was examined, evidence for a partially cognitive mediated pathway was found. In this pathway maternal overprotection contributed to a child's vigilance for neutral or angry faces. This vigilance for angry and neutral faces augmented in turn the child's levels of separation anxiety. It was a partially mediated pathway because maternal overprotection and the child's separation anxiety were not significantly associated but the absolute size of the effect between maternal overprotection and a child's separation anxiety significantly changed after controlling for the mediator (ABs to angry and neutral faces). This pathway is illustrated in the Figure below. The significant pathways are given in bold. This partially cognitive mediated pathway is again consistent with Rapee's (2001) model (See also Hudson & Rapee 2004). In his model parental overprotection would contribute to a child's cognitive bias, and this cognitive bias would contribute to the development of anxiety in the child. (See Figure 4).

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┌─────────────────┐                              ┌─────────────────┐
│  X Variable     │                              │  Y Variable     │
│  Maternal       │                              │ Child's separation
│  overprotection │                              │  anxiety        │
└─────────────────┘                              └─────────────────┘
```
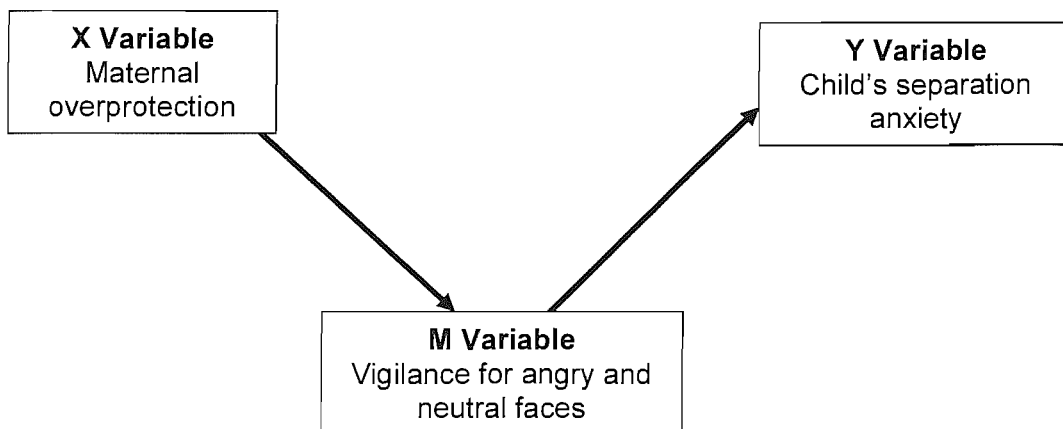
Figure 19. A partially cognitive mediated pathway in which maternal overprotection would be influencing a child's separation anxiety via an AB towards angry and neutral faces

A study looking at parent-child interaction therapy (PCIT) for treatment of separation anxiety disorder provides further evidence for a partially cognitive mediated pathway (Choate et al. 2005). The PCIT was implemented for children aged 4 to 8 with primary diagnoses of separation anxiety. In the PCIT, parents were taught to follow their child's lead in play by giving positive attention (i.e. imitation, reflection) and by avoiding negative behaviours (i.e. criticism, commands). In addition, parents were specifically taught to increase their enthusiasm for the child and to provide the child with opportunities to choose while playing. Decrease in separation-anxious behaviours was observed in children during PCIT. A mechanism proposed by the authors as contributing to that decrease was the child's increased sense of control. This increased sense of control occurred because the parents provided the child with opportunities to make decisions about play. Moreover the parents contributed to the child's sense of mastery as they reinforced the child's decisions with their positive behaviour (i.e. imitation).

The role that the child's lack of perceived control can have on the development and/or maintenance of childhood anxiety was already highlighted by Chorpita and Barlow in their model of anxiety (1998). The authors proposed that an early experience of diminished control could

make the child interpret the world as out of control. The child would then perceive the word as dangerous which would augment his/her anxiety levels. They added that the parents could be contributing to the offspring's experience of diminished control. Rapee and Heimberg (1997) in their model of adult social phobia also highlighted the role that the parents can have in enhancing the offspring's experience of diminished control. They argued that excessive control from the parent would reinforce a child's idea that he/she is not capable. As a consequence when dealing with social situations the child's mental representation of his/her performance would be negatively biased. This negative representation of his/herself in social situations would make him/her prone to attend to any perceived threat in the environment (i.e. people frowning). At the same time the individual would be prone to focus his/her attentional resources towards aspects of self image (i.e. blushing).

Empirical work provides further support for the influence of a sense of diminished control on childhood anxiety (Chorpita et al. 1998;Aycicegi, et al. 2002). In line with this work a recent study has demonstrated that mother's expectations about their children's coping abilities predict children's own expectations of their coping abilities. Interestingly it has shown that mothers who predict that their children would not cope appropriately with anxiety-provoking situations tend to have children who believe that these situations are threatening (Micco & Ehrenreich, in press).

Thus Choate et al. (2005), Micco and Ehrenreich (in press) findings, and the literature on diminished control lend support to the feasibility of a cognitive mediated pathway. In this pathway maladjusted parenting behaviours that diminish the child's sense of control could contribute to a child's separation anxiety.

Further evidence for the partially cognitive mediated pathway found with the combined data set can be found in Shrout and Bolger (2002) explanation on partial models. The statisticians explained that a situation in which partial mediation occurs is one when there are several processes

that taken together completely mediate the link between X and Y but only a subset is specified in the mediation analysis conducted. This situation has grounds to exist based on the concept of equifinality (Wood et al. 2003) and on empirical evidence (Rice, Harold & Thapar, 2002; Eley et al. 2003). The concept of equifinality is based on two premises: (1) there are multiple pathways to the same anxiety disorder, (2) a single factor such as parenting cannot account for the development of any given disorder. Twin studies argue in favour of the concept of equifinality, as they have suggested that additive genetic effects (such as temperamental dispositions) and non-shared environmental factors (such as social environment) can account for an important proportion of variance of anxiety in children. For example in a twin study of anxiety-related behaviours in pre-school children it was found that non-shared and genetic factors explained one-third and 39% respectively of the variance in separation anxiety. Shared environment explained 35% of the variance in separation anxiety (Eley et al. 2003). Interestingly the authors mentioned that parental modelling and the transmission of negative information from the parent to the child would fall into the shared environment factor because the influence of both parental mechanisms on the offspring could be the same for twin pairs. Support for the importance of modelling and transmission of negative information in fear acquisition can be found in Rachman's (1991) and Field's (2006a) work.

Based on Eley's et al. (2003) study and on the concept of equifinality (Wood et al. 2003) the model illustrated in Figure 20 is proposed:
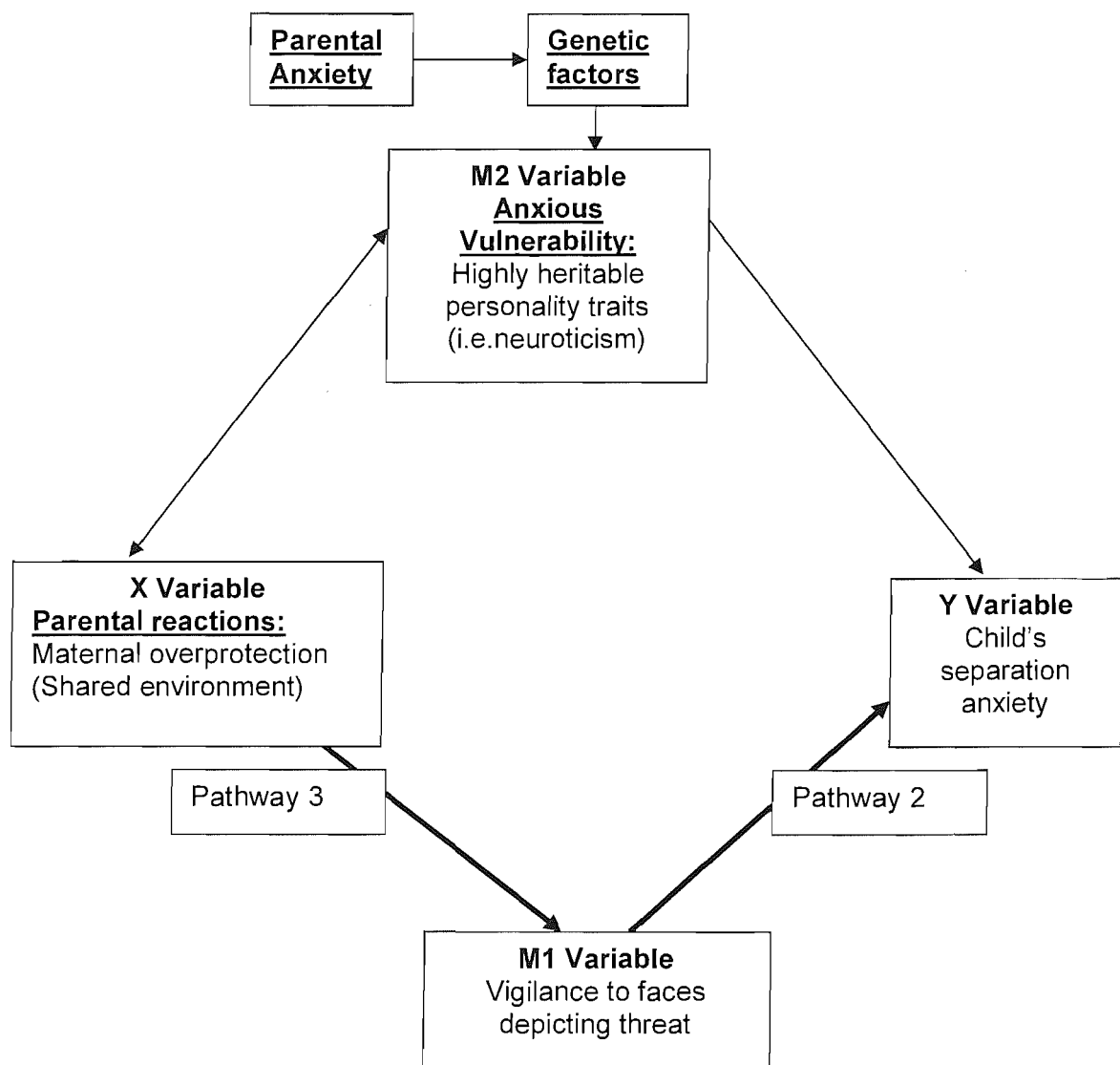
Figure 20. A proposed model in which highly heritable personality traits and ABs towards threat would act as mediators in the association between maternal overprotection and a child's separation anxiety. In bold and underlined are the terms used by Rapee (2001) in his model of development of generalised anxiety in childhood.

In this model other mediating variables (apart from cognitive biases) that were not looked at in the thesis would be mediating the association between maternal overprotection and a child's separation anxiety. For example highly heritable personality traits (M2) could be also mediating this association. Consistent with the proposed model Rapee (2001) argued that a child's anxious vulnerability such as neuroticism could contribute to childhood anxiety. He clarified that neuroticism would be a highly heritable

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personality trait. He also argued that parental reaction (i.e. overprotection) and parental genes could enhance a child's anxious vulnerability. See Figure 4 and Figure 20.

Maternal overprotection and neuroticism have been found to co-occur in individuals with single and recurrent major depressive disorders (Wilhelm, Parker, Dewhurst-Savellis & Asghari, 1999). Moreover it has been found that frustration (a facet of neuroticism) in a sample of 10 to 12 year olds increased the depressogenic effect of parental overprotection on the offspring (Oldehinkel, Veenstra, Ormel, Winter & Verhulst, 2006). Because anxiety can precede depression (Burke et al. 2005; Flannery-Schroeder, 2006) this research conveys to the viability of M2 as a mediator between maternal overprotection and a child's separation anxiety.

Bearing in mind the complexity of the anxious phenomenon other mediating variables could be explaining the association between maternal over protection and a child's separation anxiety. Another possible mediating variable could be negative social experiences. For example based on Rapee and Heimberg (1997) model it could be argued that maternal overprotection could make the child more insecure in social encounters augmenting the child's anxiety levels in social situations. Rubin and Burgess (2001) also documented that parental overprotection could prevent the child from engaging in self-initiating coping techniques. This parental behaviour would perpetuate feelings of insecurity in the child within and outside the family.

Despite the potential role of other mediating variables (i.e. negative social experiences) in the maternal overprotection-separation anxiety linkage of special theoretical interest would be to explore the pathway in which neuroticism could act as a mediator (M2) in the linkage. The importance of exploring this pathway stems from converging evidence on the effects of neuroticism in the development of anxiety (Lonigan et al. 2004; Muris et al. 2007). Lonigan et al. (2004) mentioned two pathways via which neuroticism could be contributing to the development of anxiety.

Neuroticism could be directly influencing the child's anxiety (pathway 1) or it could be influencing the child's anxiety via pre-attentional and ABs. These biases would then be mediating the relationship between neuroticism and anxiety (pathway 2). Pathway 2 in Lonigan et al.'s (2004) model would not fit with the proposed model in Figure 20, as in the proposed model both neuroticism and ABs would act as independent mediators in the relationship between maternal over protection and a child's anxiety. If an anxious vulnerability such as neuroticism was examined as a mediator of a link between maternal overprotection and the child's separation anxiety it should be borne in mind the gene –environment interaction. In other words not only parental reaction can influence a child's anxious vulnerability but this anxious vulnerability can also influence parental reactions (Rapee, 2001; Silberg & Eaves, 2004). Therefore the arrow linking overprotective attitudes in the mother with a child's anxious vulnerability is bidirectional (see Figure 20).

As a final note it should be mentioned that the proposed model above would be specific to childhood anxiety because depression in the child can counteract a child's vigilance for threat. (Bradley et al. 1997; Mogg et al. 1998).

7.4.2 Possible pathways to explain the influence of maternal depression on a child's separation anxiety.

The results in the present study yielded little evidence for a cognitive mediated pathway explanatory of an association between maternal depression and a child's separation anxiety. Two explanations can be put forward to account for this finding: (1) parental modelling (2) shared temperament.

7.4.2.1 Parental Modelling

The consistent association found between maternal depression and a child's separation anxiety could be explained by parental modelling. It could be argued that the child's observation of certain depressive behaviours and reactions from the mother would be enough for him/her to develop an anxious symptomatology. Parental modelling has been identified as influential in the development of social fears (Rapee & Heimberg, 1997; Morris 2001). In parental modelling the mother's shared cognitive schemas with the offspring would not be crucial in the development of anxiety in the child. The theoretical approach developed by Mineka et al. (1998) supports modelling as a possible mechanism via which a depressive mother could be enhancing the child's separation anxiety. The authors posited that anxiety and depression are characterised by different cognitive patterns. They argued that the perception of uncontrollability when faced with stressful life events, termed as helplessness, is linked to anxiety. On the other hand, feelings of despair, loss of interest and suicidality, termed as hopelessness are linked to depression. There is also empirical support for the argument that the cognitive schemas of mothers with depression and children with anxiety would be different enough for an interpretive or an AB favouring threat not to emerge in the mother-child linkage. Regarding ABs various studies employing a dot probe paradigm have not found an AB towards threat in children with depression or with co-occurrence of depression and anxiety (Taghavi et al. 1999; Dalgleish et al. 2003). Research findings on ABs with adults demonstrate support for the argument that ABs to threat may be specific to anxiety and not to depression (Mogg et al. 1993, Bradley et al. 1995). Regarding interpretive biases a cognitive specificity to anxiety compared with depression has also been reported (Dalgleish et al. 1997; Dineen & Hadwin, 2004).

The moderating role that ABs were found to have in the relationship between maternal depression and a child's separation anxiety give further support to the proposal that depressive mothers may not be enhancing a

child's separation anxiety via a cognitive pathway. Indeed an avoidance of angry and neutral faces strengthened the maternal depression-separation anxiety linkage whereas a vigilance of angry and neutral faces did not. This finding is consistent with the above mentioned work carried out by Taghavi et al. (1999) and Dalgleish et al. (2003). Their data suggested that depression could have a cancelling effect on vigilance to threat. This finding is also consistent with the pattern of results obtained in Study 1 in which no threat-related ABs were observed for depression in the child.

Related to these results are the findings obtained in a recent study looking at maternal depression and the child's internalising problems (Silk, Shaw, Forbes, Lane & Kovacs, 2006). In this study it was found that children's emotion regulation (ER) was moderating the relationship between maternal depression and the child's internalising problems. Specifically the up-regulation of positive emotions was a protective ER strategy for children at risk for depression. Emotion regulation has been identified as a skill closely related to self-regulatory mechanisms such as effortful control (Izard & Abe, 2004). Interestingly in the model on anxiety and the processing of threat-related information developed by Lonigan et al. (2004), effortful control (EC) was identified as a self-regulatory mechanism that could be influencing the child's attentional allocation to threat. In light of this model and based on Silk et al. (2006) research the following interpretation on the moderating role of ABs on the mother's depression-child's anxiety linkage could be made. It could be argued that an avoidance of threat-related faces would serve as a protective strategy for children with anxiety at risk of depression. An avoidance of angry faces could be a self-regulatory mechanism related to an up-regulation of positive emotions. In line with this hypothesis it has been argued that the absence of a protective bias, which would involve ignoring threatening or negative stimuli in order to focus towards positive information, may contribute to negative emotion that characterises depressive individuals (Leyman, de Raedt, Schacht & Koster, 2007)

To recap the findings in the thesis suggest that: (1) vigilance for threat is not a mediator in the relationship between maternal depression and a child's separation anxiety; (2) threat-related ABs could be a moderator of the maternal depression-child's separation anxiety linkage. Avoidance of threat-related ABs could be a protective mechanism in the relationship between maternal depression and a child's separation anxiety. A future model for research is proposed based on these findings. In this model vigilance for threat would simply reflect a by-product of a child's anxiety influenced by maternal depression. The model is illustrated in the Figure below:
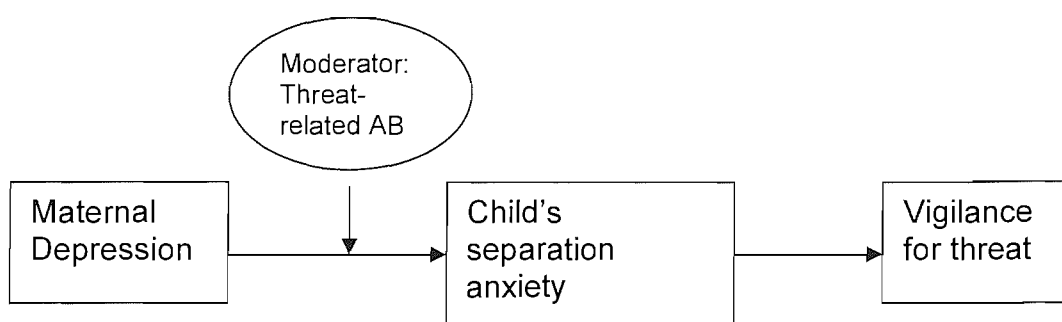
Figure 21. A proposed model explanatory of the effects of maternal depression and the child's threat-related AB on separation anxiety

In this model maternal depression would be influencing the child's separation anxiety via modelling. In support for this model there is evidence for the role of parental modelling in the development of social fears (Rapee & Heimberg, 1997; Morris, 2001). Nevertheless to what extent a mother with a depressive symptomatology can model certain behaviours that would lead to separation anxiety in the child needs to be explored further. For example little evidence was found for an association between maternal depression and a borderline EE emotional overprotection. This finding could be due to a lack of sensitivity in the EE overprotection measure, indeed the mothers qualified as borderline in overprotection and not as high. This finding could also be due to maternal behaviours other than maternal over protection driving the relationship of a mother experiencing depression with her offspring. Indeed there is evidence that indicates that

mothers with depression not only show over protective behaviours with their child but they also show withdrawn behaviours (Meadows, 1996; Elgar, McGrath, Waschbusch, Stewart & Curtis, 2004).

7.4.2.2 Shared Temperament

The consistent association found between maternal depression and a child's separation anxiety could be explained by a shared temperamental disposition. Cognitive biases would not be mediating the association. Indeed behavioural inhibition (BI) a temperamental trait characterized by a child's tendency to respond with signs of fear and withdrawal when confronted with novelty has been found linked to both depression and anxiety (Mufson et al. 2002; Muris, Meesters et al. 2003). In line with this argument a recent study by Muris et al. (2007) found that cognitive biases were not mediating the relationship between temperament and anxiety in non-referred children. The researchers suggested that temperamental factors could be playing a pivotal role in the development of psychopathological symptoms. Based on this study it could be hypothesised that cognitive biases were not mediating the association between maternal depression and a child's separation anxiety because temperamental factors and not so much cognitive biases play a pivotal role in the association. The design of the thesis could not serve to explore this hypothesis; hence further research disentangling the role of temperamental factors and cognitive biases in the mother's depression-child's separation anxiety linkage is merited.

7.5 Limitations of the study

In this section limitations of this PhD work are addressed and possibilities for the remediation of these limitations are presented.

7.5.1 Sample and sampling characteristics

For the research conducted on anxious-related ABs, it should be noted that when the sample was split into the older and younger group of children the power of the study was reduced. Analyses conducted for the older group of children achieved a power of .79, whereas analyses conducted for the younger group of children achieved a power of .70. When assessing the effects of child's depression on the anxious-related ABs observed for the older children, the power achieved was of .69. Although evidence for anxious-related ABs in the older group of children is in line with developmental approaches in cognition, a diminished power in the analysis should be born in mind. A reduced power in the study can result in an inflated familywise error rate. This familywise error rate could lead to the conclusion that there was a genuine effect in the population when there was none (Type I error). Alternatively the fact that no significant anxious-related ABs were observed for the younger group of children could be due to a lack of power in the study (Type II error). Further replication of the findings in the thesis examining age-related effects on threat-related ABs is merited. Smaller age bands with an increased sample size are needed to fully explore the development of maturational processes such as inhibitory control skills influencing the emergence of anxiety-related attentional biases in childhood. Unfortunately recruiting more participants to examine smaller age bands was not feasible in the time frame of a PhD.

Another limitation in the age-related AB effect is that the older group of children appeared to have higher levels of separation anxiety than the younger group of children. Although this difference was not significant it could confound the AB effect. In other words the threat-related AB found for

the older group of children could be due to a higher age, facilitating the emergence of this AB, but could also be due to higher levels of separation anxiety in children aged over 10.

It is also worth mentioning that the sample came from a unique cultural context. Thus the generalisability of these findings to other cultural contexts should be further explored. In addition because the studies in the thesis were carried out with a community sample it would be interesting to explore whether these findings can be generalised to clinical samples.

Participating families were recruited via schools within Hampshire, thus the number of participants was restricted by the availability of the schools and of the families. There is a high demand for schools to collaborate in research and schools are inundated with requests for participation in university projects. Therefore it would be beneficial both for school and researchers to develop a scheme that would coordinate research proposals to schools.

Despite maternal and child measures were obtained within a month, a loss of families taking part in the study took place between the time of the assessment of maternal variables and the time of assessment of the child variables. The assessment of maternal variables was carried out via questionnaires. The questionnaires were sent to the family's home with clear instructions on how to complete the questionnaires. The assessment of the child variables was primarily carried out at school. The fact that the study with the child took place based on the school's time schedule made sometimes difficult to obtain the mother's and the children's assessments close in time. Future studies could overcome this difficulty by having a rigorous recruitment period in which the time frame of the mother's and child's assessments would coincide.

One last limitation to mention is the non inclusion of father's mental heath variables and childrearing behaviours in the thesis. High levels of attrition for paternal measures restricted the study to mothers. Future

research should engage fathers in research on parenting. Some schemes engaging fathers in parenting have already been launched in Southampton. For example on 16th June 2006, the Every Father Matters Conference was held at the Southampton Solent University Conference Centre.

7.5.2.Methodology

In this section a critique of the self-report and cognitive measures employed in this study is made. Finally drawbacks in the nature of the study will be addressed.

7.5.2.1 Critique of self-report methods

In order to measure parental mental health and childrearing variables on one hand and to measure child mental health variables on the other, self-report measures were employed. There are some disadvantages of using self-report methods that should be mentioned. One major disadvantage is that they can reflect perceptions rather than the actual family functioning (Ginsburg et al. 2004). Moreover children and parents may disagree on these perceptions (De Los Reyes & Kazdin, 2005). Thus these perceptions are subject to biases. To account for these biases, two informants (the mother and the child) were included in the two studies of the thesis. Child self-reported separation anxiety was found to be significantly linked to ABs to angry faces. A link between heighten levels of a transitory anxious mood (state anxiety) as reported by the child and ABs to threatening pictures approached significance. An authoritative maternal style was found significantly associated with self-reports of separation and trait anxiety in the child. Nevertheless low maternal praise was found to significantly enhance the levels of maternal reported social anxiety in the child. Due to some discrepancies in the results obtained from child and maternal reports future studies would benefit from incorporating reports from multiple informants (Kagan et al. 2002; De Los Reyes & Kazdin, 2005).

One last limitation regarding self-report measures has been mentioned in the review on parenting and childhood anxiety by Wood et al. (2003). In this review the authors highlight that empirical investigations have found more consistent results with observational designs indicative of parental behaviours than with parental self-reports indicative of parenting styles. Thus further observational studies on parental behaviours could shed more light on the effect of parental factors on childhood anxiety.

7.5.2.2 Critique of cognitive measures

The attentional tasks employed to measure ABs to threat in children were adapted from the adult literature on ABs. Due to the novelty of these measures for assessing threat-related ABs in children, limitations of the tasks should be addressed. Although the VST was found to be sensitive to capture threat-related ABs in older children, the difficulty of the task could have overloaded a young child's limited inhibitory control skills (Kindt & van den Hout, 2001). Hence when evaluating the validity of cognitive data in children, cognitive maturation processes are to be considered (Lonigan et al. 2004; Muris 2006).

Although the MDPT has resulted to be a reliable measure for the assessment of anxious-related attentional biases in adults, further accuracy of the technique is needed specifically in children's research (i.e. setting up a time of exposure adequate to observe possible attentional biases). The paired stimuli were presented on the screen for 500ms, following research carried out with adults (Bradley et al. 1997; Mogg & Bradley 1999). It may well be that this time of exposure is not sufficient for an AB to emerge in children and that longer time exposures would capture an AB. It should be also mentioned that due to time constraints children were not assessed with a MDPT with emotional faces as stimuli, only pictorial stimuli were included in the task. The fact that faces are an ecologically valid stimuli for humans even from early childhood (Haviland & Lelwica, 1987; Turati and Simion, 2002) and that pictorial stimuli have failed to show a threat-related AB in anxious children (Waters et al. 2004; Ladouceur et al. 2005) indicates that

one limitation in the design of the MDPT was the no inclusion of faces as stimuli. A fruitful avenue of research is then to develop a MDPT with a time of exposure of stimuli adequate for children and with emotional faces as stimuli.

7.5.2.3 The nature of the study

The study was cross-sectional in nature which did not allow the directionality of the effects to be ascertained in the parental factors-childhood anxiety relationship. In addition the cross-sectional nature of the study did not allow the opportunity to ascertain whether cognitive biases play a causal role in the development of anxiety or whether they are a mere epiphenomenon of anxiety in childhood. However the partially cognitive mediated pathway found in the thesis fits with the hypothesis that cognitive biases could play a causal role in the development of anxiety in the child. Possible remediations of these limitations in future studies are presented in the next section.

7.5.3. Concluding Remarks and Future Work

In conclusion, this thesis demonstrated that certain parental and cognitive factors can influence a child's anxious symptomatology. In doing so the problem of non-specificity when measuring parental factors is overcome (Wood et al. 2003). Indeed specific parental factors such as maternal overprotection were found to influence a child's separation anxiety in a distal relationship. Interestingly maternal depression was also found to influence a child's separation anxiety in a direct link. The possible moderating role of threat-related ABs in the relationship between maternal depression and a child's separation anxiety is also outlined.

Evidence for the role of indirect pathways of transmission of anxiety was found (Rachman, 1991; Field, 2006a; 2006b). Maternal modelling and maternal transmission of an anxious cognitive style are identified as possible pathways via which the mother could be contributing to the child's

anxiety. On one hand the data suggests that modelling could be explaining the association between maternal depression and the child's separation anxiety. On the other hand the data also gives support for a partially cognitive mediated pathway in which maternal overprotection would enhance a child's vigilance for threat and vigilance for threat would augment in turn the child's separation anxiety. This partially cognitive mediated pathway is consistent with Rapee's (2001) model on the development of generalised anxiety.

The findings of the thesis highlight the complexity of ascertaining cognitive and family factors contributing to anxiety in the child. Developmental psychopathology approaches acknowledge this complexity (Davies & Cicchetti, 2004; Muris 2006). The concepts of equifinality and multifinality (Wood et al. 2003) also reflect this complexity. A quotation from Rapee and Spence (2004) shows very well the difficulty engrained in studying the aetiology of anxiety: "There are many possible pathways and risk factors that may eventuate in higher levels of social fears and none of these is likely to be necessary for social phobia to develop".

Despite the documented difficulties in research on cognitive, family factors and childhood anxiety, the findings of this thesis have important theoretical, methodological and clinical implications.

The work in this thesis has advanced the knowledge on possible maternal mechanisms of transmission of anxiety to the child taking into account a developmental approach. Developmental considerations are germane to examinations of cognitive biases and parental factors contributing to childhood anxiety so specific theoretical models on the aetilogy of anxiety can be proposed. The work on this thesis has also put side by side two methodologies that have been designed to assess ABs in children: the VST (adapted from Hadwin et al. 2003) the MDPT (specifically designed for this thesis). The VST was found to possess utility for assessing threat-related ABs in older children. The development of cognitive measures sensitive to children is warranted to acquire a full

understanding of information-processing factors linked to childhood anxiety (Vasey et al. 2003). Finally the threat-related AB observed for children with separation anxiety, can help professionals to implement therapies directed to eliminate these threat-related ABs. Pioneering work on the implementation of attentional and interpretive training programmes aimed to re-direct an individual's cognitive bias to threat has been successful in anxious adults (MacLeod et al. 2002 & Yiend & Mackintosh 2004).

Due to the important implications of the work undergone in this thesis future research is warranted. A fruitful line of research that would add knowledge on the effects of parental and cognitive factors on a child's anxiety relates to issues of cumulative effects. Regarding parental factors Luecken et al. (2006) stated that the cumulative effects of an individual's maladaptive responses which originated in a non-favourable early family relationship could make the individual vulnerable to physical and psychological illness. Regarding cognitive factors Chorpita and Barlow (1998) stated that a history of lack of control could put an individual at risk to experience chronic anxiety. Over time the individual would have acquired a tendency of perceive or process events as not within his/her control.

An additional line of research deemed to be explored is the direction of effects in the parenting-childhood anxiety linkage. As mentioned earlier the cross-sectional nature of the study did not permit to establish whether maternal over protective behaviours or maternal rejecting behaviours were impinging on a child's separation or social anxious symptomatology respectively. Longitudinal studies, together with intervention and experimental designs, would shed light on a causal relationship in the linkage (Wood et .al., 2003). When looking at this parenting-childhood anxiety linkage the role of the fathers in parenting should be also investigated (Bögels & Brechman-Toussaint 2006) In order to further understand the role of the parents on the child's anxiety via a cognitive mediated pathway, it would be interesting to assess not only the child's anxious cognitive style but also the parent's anxious cognitive style. The rationale for doing so would be to explore whether both the parents and the

offspring share an anxious cognitive schema (Kendall 1983). Some promising research has been already done looking at parental and child cognitions in the context of the family (Bughental & Johnston, 2000; Creswell et al. 2005).

Another challenge facing investigators is to determine whether anxiety-related biases can cause anxiety (Mathews & Macleod, 2002; Hadwin et al. 2006). Once more intervention and longitudinal studies could serve to ascertain whether threat-related ABs can cause anxiety or whether these ABs are only an epiphenomenon of an anxious symptomatolgy and simply co-occur with it. Finally despite the fact that work in this thesis has commenced the important task of charting the developmental origins of anxiety-related biases, the moderating role of EC processes in the development of threat-related ABs needs further exploration (Hadwin, et al. 2006). When exploring the moderating role of EC processes on threat-related ABs, temperamental traits should be also borne in mind (Lonigan et al. 2004; Muris et al. 2007).

Appendix A: Children Questionnaires

A1. RCADS (Chorpita et al. 2000)

Please put a circle around the word that shows how often each of these things happen to your child. There are no right or wrong answers.

I worry about bad things happening to me	Never	Sometimes	Often	Always
I worry about what will happen	Never	Sometimes	Often	Always
I am worried that something bad will happen to myself	Never	Sometimes	Often	Always
I am worried that something awful will happen to my family	Never	Sometimes	Often	Always
I am worried about what others think of me	Never	Sometimes	Often	Always
I think about the death	Never	Sometimes	Often	Always
I am worried that I might look foolish	Never	Sometimes	Often	Always
I worry about things in bed at night	Never	Sometimes	Often	Always
I feel worthless	Never	Sometimes	Often	Always
I can't get bad or silly thoughts out of my head	Never	Sometimes	Often	Always
I am bothered by bad or silly thoughts or images	Never	Sometimes	Often	Always
I am afraid of looking foolish in front of people	Never	Sometimes	Often	Always
I worry about things	Never	Sometimes	Often	Always
I am scared to sleep alone	Never	Sometimes	Often	Always
I fear being away from my parents	Never	Sometimes	Often	Always
I fear being alone at home	Never	Sometimes	Often	Always
I am scared when I have to sleep away from home	Never	Sometimes	Often	Always
I worry that I will suddenly get scared for no reason	Never	Sometimes	Often	Always
I suddenly feel very scared for no reason	Never	Sometimes	Often	Always

I am afraid of being in crowded places	Never	Sometimes	Often	Always
I worry about doing poorly at things	Never	Sometimes	Often	Always
I worry about making mistakes	Never	Sometimes	Often	Always
I am scared when I have to take a test	Never	Sometimes	Often	Always
I am worried that I will do badly at school	Never	Sometimes	Often	Always
I am afraid to talk in front of the class	Never	Sometimes	Often	Always
I feel worried when someone is angry with me	Never	Sometimes	Often	Always
I feel nervous or scared when going to school	Never	Sometimes	Often	Always
I suddenly tremble and shake for no reason	Never	Sometimes	Often	Always
My heart suddenly beats too quickly for no reason	Never	Sometimes	Often	Always
When I have a problem I feel shaky	Never	Sometimes	Often	Always
When I have a problem my heart beats really fast	Never	Sometimes	Often	Always
I suddenly have trouble with breathing for no reason	Never	Sometimes	Often	Always
I have to think special thoughts to stop bad events	Never	Sometimes	Often	Always
When I have a problem my stomach feels funny	Never	Sometimes	Often	Always
I feel very tired	Never	Sometimes	Often	Always
I feel sad or empty	Never	Sometimes	Often	Always
I have problems with my appetite	Never	Sometimes	Often	Always
I suddenly become dizzy for no reason	Never	Sometimes	Often	Always

A2. STAIC (Spielberger 1970) How I feel questionnaire STATE

A number of statements which boys and girls use to describe themselves are given below. Read each statement carefully and decide how you feel *right now*. Then put an X in the box in front of the word or phrase which best describes how you feel. There are no right or wrong answers. Don't spend too much time on any one statement. Remember, find the word or phrase which best describes how you feel right now, *at this very moment*.

1	I feel	very	calm	calm	not	calm
2	I feel	very	upset	upset	not	upset
3	I feel	very	pleasant	pleasant	not	pleasant
4	I feel	very	Nervous	Nervous	not	Nervous
5	I feel	very	Jittery	Jittery	not	Jittery
6	I feel	very	Rested	Rested	not	Rested
7	I feel	very	Scared	Scared	not	Scared
8	I feel	very	Relaxed	Relaxed	not	Relaxed
9	I feel	very	Worried	Worried	not	Worried
10	I feel	very	Satisfied	Satisfied	not	Satisfied
11	I feel	very	Frightened	Frightened	not	Frightened
12	I feel	very	Happy	Happy	not	Happy
13	I feel	very	Sure	Sure	not	Sure
14	I feel	very	Good	Good	not	Good
15	I feel	very	Troubled	Troubled	not	Troubled
16	I feel	very	Bothered	Bothered	not	Bothered
17	I feel	very	Nice	Nice	not	Nice
18	I feel	very	Terrified	Terrified	not	Terrified
19	I feel	very	Mixed-up	Mixed-up	not	Mixed-up
20	I feel	very	Cheerful	Cheerful	not	Cheerful

A3. STAIC (Spielberger 1970) How I feel questionnaire TRAIT

A number of statements which boys and girls use to describe themselves are given below. Read each statement carefully and decide if it is *hardly-ever*, or *sometimes*, or *often* true for you. Then for each statement put an X in the box in front of the word that seems to describe you best. There are no right or wrong answers. Don't spend too much time on any one statement. Remember, choose the word which seems to describe how you usually feel.

1	I worry about making mistakes	hardly-ever	sometimes	often
2	I feel like crying	hardly-ever	sometimes	often
3	I feel unhappy	hardly-ever	sometimes	often
4	I have trouble making up my mind	hardly-ever	sometimes	often
5	It is difficult for me to face problems	hardly-ever	sometimes	often
6	I worry too much	hardly-ever	sometimes	often
7	I get upset at home	hardly-ever	sometimes	often
8	I am shy	hardly-ever	sometimes	often
9	I feel troubled	hardly-ever	sometimes	often
10	Unimportant thoughts run through my mind and bother me	hardly-ever	sometimes	often
11	I worry about school	hardly-ever	sometimes	often
12	I have trouble deciding what to do	hardly-ever	sometimes	often
13	I notice my heart beats faster	hardly-ever	sometimes	often
14	I am secretly afraid	hardly-ever	sometimes	often
15	I worry about my parents	hardly-ever	sometimes	often
16	My hands get sweaty	hardly-ever	sometimes	often
17	I worry about things that may happen	hardly-ever	sometimes	often
18	It is hard for me to fall asleep at night	hardly-ever	sometimes	often
19	I get a funny feeling in my stomach	hardly-ever	sometimes	often
20	I worry about what others think of me	hardly-ever	sometimes	often

Appendix B: Parent Questionnaires
B1. STAI – Trait (Spielberger 1983)

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you *generally* feel.

		Almost Never	Sometimes	Often	Almost Always
21	I feel pleasant	1	2	3	4
22	I feel nervous and restless	1	2	3	4
23	I feel satisfied with myself	1	2	3	4
24	I wish I could be as happy as others seem to be	1	2	3	4
25	I feel like a failure	1	2	3	4
26	I feel rested	1	2	3	4
27	I am "calm, cool, and collected"	1	2	3	4
28	I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29	I worry too much over something that really doesn't matter	1	2	3	4
30	I am happy	1	2	3	4
31	I have disturbing thoughts	1	2	3	4
32	I lack self-confidence	1	2	3	4
33	I feel secure	1	2	3	4
34	I make decisions easily	1	2	3	4
35	I feel inadequate	1	2	3	4
36	I am content	1	2	3	4
37	Some unimportant thought runs through my mind and bothers me	1	2	3	4
38	I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39	I am a steady person	1	2	3	4
40	I get in a state of tension and turmoil as I think over my recent concern and interests	1	2	3	4

B2. BDI-II (Beck 1996)

BDI®-II

Date: _____

Name: _____ Marital Status: _____ Age: _____ Sex: _____

Occupation: _____ Education: _____

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the past two weeks, **including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness	**6. Punishment Feelings**
0 I do not feel sad.	0 I don't feel I am being punished.
1 I feel sad much of the time.	1 I feel I may be punished.
2 I am sad all the time.	2 I expect to be punished.
3 I am so sad or unhappy that I can't stand it.	3 I feel I am being punished.

2. Pessimism

0   I am not discouraged about my future.
1   I feel more discouraged about my future than I used to be.
2   I do not expect things to work out for me.
3   I feel my future is hopeless and will only get worse.

3. Past Failure

0   I do not feel like a failure.
1   I have failed more than I should have.
2   As I look back, I see a lot of failures.
3   I feel I am a total failure as a person.

4. Loss of Pleasure

0   I get as much pleasure as I ever did from the things I enjoy.
1   I don't enjoy things as much as I used to.
2   I get very little pleasure from the things I used to enjoy.
3   I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

0   I don't feel particularly guilty.
1   I feel guilty over many things I have done or should have done.
2   I feel quite guilty most of the time.
3   I feel guilty all of the time.

7. Self-Dislike

0   I feel the same about myself as ever.
1   I have lost confidence in myself.
2   I am disappointed in myself.
3   I dislike myself.

8. Self-Criticalness

0   I don't criticize or blame myself more than usual.
1   I am more critical of myself than I used to be.
2   I criticize myself for all of my faults.
3   I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

0   I don't have any thoughts of killing myself.
1   I have thoughts of killing myself, but I would not carry them out.
2   I would like to kill myself.
3   I would kill myself if I had the chance.

10. Crying

0   I don't cry anymore than I used to.
1   I cry more than I used to.
2   I cry over every little thing.
3   I feel like crying, but I can't.

_____ Subtotal Page 1

Continued on Back

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11. Agitation

0   I am no more restless or wound up than usual.

1   I feel more restless or wound up than usual.

2   I am so restless or agitated that it's hard to stay still.

3   I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0   I have not lost interest in other people or activities.

1   I am less interested in other people or things than before.

2   I have lost most of my interest in other people or things.

3   It's hard to get interested in anything.

13. Indecisiveness

0   I make decisions about as well as ever.

1   I find it more difficult to make decisions than usual.

2   I have much greater difficulty in making decisions than I used to.

3   I have trouble making any decisions.

14. Worthlessness

0   I do not feel I am worthless.

1   I don't consider myself as worthwhile and useful as I used to.

2   I feel more worthless as compared to other people.

3   I feel utterly worthless.

15. Loss of Energy

0   I have as much energy as ever.

1   I have less energy than I used to have.

2   I don't have enough energy to do very much.

3   I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0   I have not experienced any change in my sleeping pattern.

1a   I sleep somewhat more than usual.

1b   I sleep somewhat less than usual.

2a   I sleep a lot more than usual.

2b   I sleep a lot less than usual.

3a   I sleep most of the day.

3b   I wake up 1–2 hours early and can't get back to sleep.

17. Irritability

0   I am no more irritable than usual.

1   I am more irritable than usual.

2   I am much more irritable than usual.

3   I am irritable all the time.

18. Changes in Appetite

0   I have not experienced any change in my appetite.

1a   My appetite is somewhat less than usual.

1b   My appetite is somewhat greater than usual.

2a   My appetite is much less than before.

2b   My appetite is much greater than usual.

3a   I have no appetite at all.

3b   I crave food all the time.

19. Concentration Difficulty

0   I can concentrate as well as ever.

1   I can't concentrate as well as usual.

2   It's hard to keep my mind on anything for very long.

3   I find I can't concentrate on anything.

20. Tiredness or Fatigue

0   I am no more tired or fatigued than usual.

1   I get more tired or fatigued more easily than usual.

2   I am too tired or fatigued to do a lot of the things I used to do.

3   I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0   I have not noticed any recent change in my interest in sex.

1   I am less interested in sex than I used to be.

2   I am much less interested in sex now.

3   I have lost interest in sex completely.

_____ Subtotal Page 2

_____ Subtotal Page 1

_____ Total Score

NR15645

B3. PSDQ (Robinson et al. 2001)

B3.a. Instructions- Mother's Form

Directions:

This questionnaire is designed to measure (1) *how often your spouse/partner* exhibits certain behaviors towards your child (name) and (2) *how often you* exhibit certain behaviors towards this child.

Example:

(1) Please read each item on the questionnaire and think about *how often your spouse/partner* [He] exhibits this behavior and place your answer on the first line to the left of the item.

[He]   [I]

_____3_____ _____ 1. **[He allows]**[I allow] our child to choose what to wear to school.

SPOUSE EXHIBITS THIS BEHAVIOR:
1 = Never
2 = Once in Awhile
3 = About Half of the Time
4 = Very Often
5 = Always

(2) Then rate *how you* **[I]** exhibit this behavior and place your answer on the **second** line to the left of the item.

[He]   [I]

 3   2   1.   [He allows][**I allow**] our child to choose what to wear
                    to school.

<u>I EXHIBIT THIS BEHAVIOR</u>:

1 = Never

2 = Once in Awhile

3 = About Half of the Time

4 = Very Often

5 = Always

B3. b. Instructions-Father's Form

The father's instructions form is the same as the mother's form. The only difference between the two forms is that "She allows" is employed in the father's form instead of "He allows".

B3.c. PSDQ Items- Mother's Form

The items in the Father's Form are identical, but [He is] is replaced by [She is]

[He]   [I]

_____ _____   1. [He is] [I am] responsive to our child's feelings and needs.

_____ _____   2. [He uses] [I use] physical punishment as a way of disciplining our child.

_____ _____   3. [He takes] [I take] our child's desires into account before asking the child to do something.

_____ _____   4. When our child asks why he/she has to conform, [he states] [I state]: because I said so, or I am your parent and I want you to.

_____ _____   5. [He explains] [I explain] to our child how we feel about the child's good and bad behavior.

_____ _____   6. [He spanks] [I spank] when our child is disobedient.

_____ _____   7. [He encourages] [I encourage] our child to talk about his/her troubles.

_____ _____   8. [He finds] [I find] it difficult to discipline our child.

_____ _____   9. [He encourages] [I encourage] our child to freely express himself/herself even when disagreeing with parents.

_____ _____   10. [He punishes] [I punish] by taking privileges away from our child with little if any explanations.

_____ _____   11. [He emphasizes] [I emphasize] the reasons for rules.

_____ _____   12. [He gives] [I give] comfort and understanding when our child is upset.

_____ _____   13. [He yells or shouts] [I yell or shout] when our child misbehaves.

_____ _____   14. [He gives praise] [I give praise] when our child is good.

_____ _____   15. [He gives] [I give] into our child when the child causes a commotion about something.

_____ _____   16. [He explodes] [I explode] in anger towards our child.

_____ _____   17. [He threatens] [I threaten] our child with punishment more often than actually giving it.

_____ _____   18. [He takes] [I take] into account our child's preferences in

making plans for the family.

_____ _____ 19. [He grabs] [I grab] our child when being disobedient.

_____ _____ 20. [He states] [I state] punishments to our child and does not actually do them.

_____ _____ 21. [He shows] [I show] respect for our child's opinions by encouraging our child to express them.

_____ _____ 22. [He allows] [I allow] our child to give input into family rules.

_____ _____ 23. [He scolds and criticizes] [I scold and criticize] to make our child improve.

_____ _____ 24. [He spoils] [I spoil] our child.

_____ _____ 25. [He gives] [I give] our child reasons why rules should be obeyed.

_____ _____ 26. [He uses] [I use] threats as punishment with little or no justification.

_____ _____ 27. [He has] [I have] warm and intimate times together with our child.

_____ _____ 28. [He punishes] [I punish] by putting our child off somewhere alone with little if any explanations.

_____ _____ 29. [He helps] [I help] our child to understand the impact of behavior by encouraging our child to talk about the consequences of his/her own actions.

_____ _____ 30. [He scolds or criticizes] [I scold or criticize] when our child's behavior doesn't meet our expectations.

_____ _____ 31. [He explains] [I explain] the consequences of the child's behavior.

_____ _____ 32. [He slaps] [I slap] our child when the child misbehaves.

B4. BAI (Beck et al. 1988)

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by that symptom during the past month, including today, by circling the number in the corresponding space in the column next to each symptom.

	Not At All	Mildly but it didn't bother me much.	Moderately - it wasn't pleasant at times	Severely – it bothered me a lot
1. Numbness or tingling	0	1	2	3
2. Feeling hot	0	1	2	3
3. Wobbliness in legs	0	1	2	3
4. Unable to relax	0	1	2	3
5. Fear of worst happening	0	1	2	3
6. Dizzy or lightheaded	0	1	2	3
7. Heart pounding/racing	0	1	2	3
8. Unsteady	0	1	2	3
9. Terrified or afraid	0	1	2	3
10. Nervous	0	1	2	3
11. Feeling of choking	0	1	2	3
12. Hands trembling	0	1	2	3
13. Shaky / unsteady	0	1	2	3
14. Fear of losing control	0	1	2	3
15. Difficulty in breathing	0	1	2	3
16. Fear of dying	0	1	2	3
17. Scared	0	1	2	3
18. Indigestion	0	1	2	3
19. Faint / lightheaded	0	1	2	3
20. Face flushed	0	1	2	3
21. Hot/cold sweats	0	1	2	3

B5. APPQ (Rapee et al. 1994)

Please rate, on the following scale, the amount of fear that you think you would experience in each of the situations listed below if they were to occur *in the next week.* Try to imagine yourself actually doing each activity and how you would feel.

<u>Fear Scale</u>

0--------1---------2 -------------3-----------4----------------5------------6----------7-----------8

(No fear)   (Slight fear)   (Moderate fear)   (Marked fear)   (Extreme fear)

1. Talking to people
2. Going through a car wash
3. Playing a vigorous sport
4. Blowing up an airbed quickly
5. Eating in front of others
6. Hiking on a hot day
7. Getting gas at a dentist
8. Interrupting a meeting
9. Giving a speech
10. Exercising vigorously alone
11. Going long distances from home alone
12. Introducing yourself to groups
13. Walking alone in isolated areas
14. Driving on highways
15. Wearing striking clothes
16. Possibility of getting lost
17. Drinking a strong cup of coffee
18. Sitting in the center of a cinema
19. Running up stairs
20. Riding on a subway
21. Speaking on the telephone
22. Meeting strangers
23. Writing in front of others
24. Entering in a room full of people
25. Staying overnight away from home
26. Feeling the effects of alcohol
27. Going over a long, low bridge

Appendix C: Cognitive Tasks Stimuli
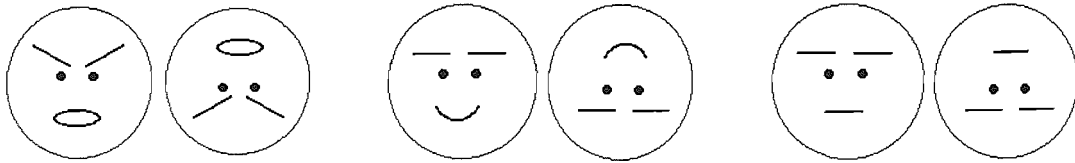
Figure C1. Stimuli of the VST: Angry, happy and neutral face with their correspondent distractor

Figure C2. Example of a critical trial in the MDPT

Appendix D

D1.The eight stories of the story task in Study 1

Threatening Social

1. This is Fiona. Fiona sees Billy across the street and waves to him. Billy doesn't wave back. (17words)

Other question: Does Fiona think:

Billy doesn't want to wave. *Negative option*
Billy is thinking about something else. *Neutral option*
Billy hasn't seen her. *Positive option*

Self question: If you waved to someone and they didn't wave back. Would you think:

They didn't want to wave?
They were thinking about something else?
They hadn't seen you?

2. Tom sees some children playing and walks over to join them. As he gets closer, he can hear them laughing. (20 words)

Other question: Does Tom think:

They are having fun. *Positive option*
They are laughing at him. *Negative option*
They are friends. *Neutral option*

Self question: If you walked over to play with some children and they started laughing. Would you think:

They were having fun
They were laughing at you
They were friends

Threatening Physical

3. Sarah's parents go out for the evening and leave her with a babysitter. It's getting late and they still aren't home yet. (23 words)

Other question: Does John think:

Something bad has happened to them. *Negative option*
They're having fun. *Positive option*
There was lots of traffic. *Neutral option*

Self question: If your parents went out for the evening and hadn't arrived how yet. Would you think:

Something bad had happened to them
They were having fun
There was lots of traffic

4. Peter is in bed. He hears a noise in the hallway. (11 words)

Other question: Does Peter think:

The cat is playing downstairs. *Positive option*
The heating system is making a noise. *Neutral option*
A robber is in the house. *Negative option*

Self question: If you were in bed and you heard a noise in the hallway. Would you think:

The cat was playing downstairs
The heating system was making a noise
A robber was in the house

Ambiguous Social

5. Tina's having a birthday party. In school she meets some invited children; they tell her they are looking forward to her party. (22 words)

Other question: Does Tina think:

These children will go along to the party *Neutral option*

These children will have a great time at the party. *Positive option*

These children are just being polite they do not want to go to the party. *Negative option*

Self question: If invited children told you they were looking forward to come to your birthday party. Would you think:

These children will come along to the party

These children will have a great time at the party

These children are just being polite and they do not want to go to the party.

6. Peter has a new neighbour, Claire. He has played once with Claire. When he is outside he sees Claire smiling and waving from her garden: (25 words)

Other question: Does Peter think:

Claire is saying hello. *Neutral option*

Claire is telling Peter to go away. *Negative option*

·Claire wants him to come and play. *Positive option*

Self question: If your new neighbour smiled and waved at your from the garden. Would you think:

The neighbour was saying hello

The neighbour was telling you to go away

The neighbour wanted you to come and play.

Ambiguous Physical

7. Elizabeth pushes Jane up and down on the swing. Jane likes Elizabeth to push her really high (16 words)

Other question: Does Elizabeth think:

She is going to fall off. *Negative option*
She is going higher. *Neutral option*
She is having fun. *Positive option*

Self question: If you enjoyed swinging high and someone pushed you up and down. Would you think

You were going to fall off
You were going higher
You were having fun

8. Jennifer loves to eat cake. Jennifer's daddy gives her cake for tea. (12 words)

Other question: Does Jennifer think:

The cake looks delicious and she will enjoy it. *Positive option*
She will have tummy ache after eating the cake. *Negative option*
She won't feel hungry after eating the cake. *Neutral option*

Self question: If your daddy gave you a cake for tea. Would you think:

The cake looked delicious and you would enjoy it
You would have tummy ache after eating the cake
You would not feel hungry after eating the cake.

:

D2.The eleven stories of the story task in Study 2

Panic stories

1. Lena is in her room sitting at her desk, she is looking at a book. It is in the afternoon and her mum is cooking some food. Suddenly Lena notices that her heart is pounding and she is dizzy and short of breath. What is Lena thinking?

Anxious I am afraid. I think I am seriously ill and need a doctor.

Positive: I am very excited. It's my birthday and my classmates will be coming to my birthday party right away.

Neutral: I have just arrived from school. I have run the whole way home and I am tired.

2. Tom is in a busy playground. He enjoys playing with the sand and especially likes building sand castles. Tom has finished building a big sand castle when he suddenly feels that he has trouble catching his breath and that he is dizzy. What is Tom thinking?

Anxious: I think there is something really wrong with me.

Positive: I am the happiest boy in the world! I have just been told that I have won a price for building the biggest sand castle.

Neutral: I have realised that I have not had a drink of water for the whole afternoon.

3. It is a lovely summer afternoon and Amy has decided to go for a walk in the forest. She has caught a train to get there because the forest is far away from home. She is looking at a map because she has never been here before. Suddenly she feels her heart racing and very hot. What is Amy thinking?

Anxious: Something bad is going to happen to me.

Positive: I am so lucky to be in this forest! I can go horse riding here.

Neutral: It is very sunny I will sit under the shadow of a tree.

Generalized anxiety stories

1. Greg is watching the news. He doesn't know exactly what it is about but he sees pictures of children. They are afraid; some of them are crying. The news reader is saying: "These are the last images from the area that has been hit by an earthquake". What is Greg thinking?

Anxious: This is terrible. Every time I watch the news I realise how scary the world is.

Positive: I am sure that the earthquake was forecasted and that nobody has died.

Neutral: I will change to another channel to see if they give more information about the news.

2. Alex has always been reasonably good at maths. His marks have always been around 7 and 8 out of ten. Today the teacher comes into the class and says that there will be a test in maths tomorrow. He adds that it will be a difficult test. What is Alex thinking?

Anxious: I will study a lot. I am worried that I won't do well.

Positive: I am good at maths. If I study I am sure I can have a 7 or 8.

Neutral: I will do more revision than usual.

3. Ann's mother is preparing a cake. She puts the cake in the oven. Because she has to go she asks her to turn the oven off in time. She tells her exactly how to do it. When her mother is gone, Ann watches TV. At some point she remembers that she has to turn off the oven, but she has forgotten what time she was supposed to do it. What is Ann thinking?

Anxious: I am afraid that the cake will burn. I am not sure at what point I have to turn the oven off.

Positive: The cake looks delicious, if I turn off the oven now it will taste lovely.

Neutral: I will check in a cookbook to see when I should turn the oven off.

Separation Stories

1. John's parents have got tickets for the theatre. They want to go this weekend to the performance. They will arrive home very late so they arranged for john to sleep with a friend. What is John thinking?

Anxious: When I go to sleep over, something bad could happen to me or my parents

Positive: I am going to stay at a friend's house for the whole weekend. I am very happy and excited.

Neutral: I will ring a friend to tell him/her.

2. It is Monday morning and Jane is getting ready for school. While she is dressing up she realizes that she feels dizzy and has a funny feeling in her stomach. What is Jane thinking?

Anxious: On the way to school something bad could happen to me

Positive: I am very happy and excited. We are performing a play at school today

Neutral: I got out of bed too fast

3. Peter is shopping with his mum in a crowded store. Peter is looking for a nice jacket. When he has found a jacket he turns around to call his mum, but he doesn't see her in the crowd. He calls her, but nobody answers. What is Peter thinking?

Anxious: I have lost my mum. I do not know what to do .. maybe someone wants to hurt me.

Positive: Mum is looking for other nice clothes around the store to buy me.

Neutral: I cannot see my mum because it is a crowded large store.

4. Mary is going on a school trip today. They are going to the mountains for two days. They will camp in a valley. When she is preparing her luggage she starts feeling headachy and dizzy. What is Mary thinking?

Anxious: We could have a car accident on our way to the valley

Positive: I have been thinking so much about this school trip...I feel really happy and excited.

Neutral: I have been preparing the luggage since early this morning. I need a rest.

5) Alan is going away with his friend and his parents. They are going to a beach resort that is two hours drive from their town. His friend is going to come and pick him up in a few minutes. Suddenly he starts having a stomach ache and a headache. What is Alan thinking?

Anxious I might get in a car accident

Positive: The headache and stomach ache will go away soon and I will have a great time

Neutral: I played outside too much

Appendix E: Error analyses for the VST

The main effects of Emotion ($F(2,254) = 12.92$, $p < .01$) Target ($F(1,127) = 75.28$, $p < .01$) and Set Size ($F(2,254) = 47.07$, $p < .01$) were significant. More errors were committed in the neutral condition (mean errors = 7 %) compared to the angry (mean errors = 5.1%) and happy (mean errors = 4.7%) conditions. More errors were committed in the present judgements (mean errors = 7.4%) compared to the absent judgements (mean errors = 3.8%). In addition errors, increased linearly with set size. More errors were made in set size 6 (mean errors = 7.4%) than in set size 4 (mean errors = 5.6%) and more errors were made in set size 4 than in set size 2 (mean errors = 3.8 %). A significant interaction between Emotion and Target ($F(2,254) = 29.75$, $p < .01$) was found. More errors were made in the present vs. the absent trials for the happy and neutral faces. The percentage of errors in the absent trials was 3.4% for both emotion conditions. The percentage of errors in the present trials for the happy condition was 6% and for the neutral condition 10%. A significant interaction between Target and Set Size ($F(2,254) = 48.87$, $p < .01$) was also found. Errors committed in the present condition increased linearly with set size. Finally a significant interaction between Emotion and Set Size ($F(4,508) = 7.38$, $p < .01$) was found. ANOVAs comparing all emotion conditions in pairwise fashion were carried out to explore this interaction. It was found a significant interaction between emotion and set size for neutral and happy and for neutral and angry but not for angry and happy emotion conditions. For happy and angry emotion conditions the percentage of errors committed in set size 2 was not significantly different from the percentage of errors committed in set size 4

Appendix F: Search performances in the VST

Table F1

Summary statistics describing search performance in each condition of the VST

Condition	Response	Slope		Intercept
		RT	Errors	
Angry				
	Absent	208.93	.13	866.05
	Present	ˋ117.91	.17	916.03
Happy				
	Absent	222.16	.10	826.52
	Present	126.37	.18	892.14
Neutral				
	Absent	245.47	.10	862.05
	Present	151.43	.31	911.09

Appendix G: Correlation tables illustrating mother-child agreement of anxiety and depression measures

Table G1

Correlations of self-report and mother's report of anxiety and depression symptoms in younger children-Study 1

	1	2	3	4	5	6	7	8	9
1. Self-reported separation anxiety	1	.53**	.45**	.77**	.44**	.32	.13	.04	.16
2. Self-reported social anxiety		1	.66**	.90**	.71**	.23	.31	-.09	.35
3. Self-reported depression			1	.68**	.60**	.14	.22	-.09	.18
4. Self-reported total trait anxiety (RCADS)				1	.74**	.30	.31	-.08	.41*
5. Self-reported trait anxiety (STAIC)					1	.14	.23	-.06	.25
6. Mother's report of child's separation anxiety						1	.55*	.25	.70**
7. Mother's report of child's social anxiety							1	.487*	.85**
8. Mother's report of child's depression								1	.49*
9. Mother's report of child's total trait anxiety (RCADS)									1

$* p<.05$, $** p<.01$ (two-tailed)

Table G2

Correlations of self-report and mother's report of anxiety and depression symptoms in older children-Study 1

	1	2	3	4	5	6	7	8	9
1. Self-reported separation anxiety	1	.71**	.68**	.83**	.66**	.69**	.53**	.70**	.80**
2. Self-reported social anxiety		1	.61**	.92**	.67**	.52**	.57**	.45*	.63**
3. Self-reported depression			1	.74**	.76**	.56**	.41*	.53**	.62**
4. Self-reported total trait anxiety (RCADS)				1	.78**	.65**	.54**	.58**	.75**
5. Self-reported trait anxiety (STAIC)					1	.62**	.45*	.63**	.66**
6. Mother's report of child's separation anxiety						1	.70**	.66**	.89**
7. Mother's report of child's social anxiety							1	.50*	.84**
8. Mother's report of depression								1	.76**
9. Mother's report of total trait anxiety (RCADS)									1

$p<.05$,** $p<.01$(two-tailed)

Table G3

Correlations of self-report and mother's report of anxiety and depression symptoms in older children-Study 2

	1	2	3	4	5	6	7	8
1. Self-reported separation anxiety	1	.52**	.60**	.87**	.41*	.36*	.37*	.43*
2. Self-reported social anxiety		1	.44*	.71**	.11	.42*	.18	.28
3. Self-reported depression			1	.62**	.10	.27	.24	.29
4. Self-reported total trait anxiety (RCADS)				1	.26	.39*	.26	.39*
5. Mother's report of child's separation anxiety					1	.45*	.60**	.70**
6. Mother's report of child's social anxiety						1	.59**	.86**
7. Mother's report of depression							1	.72**
8. Mother's report of total trait anxiety (RCADS)								1

*p<.05, ** p<.01(two-tailed)

Table G4

Correlations of self-report and mother's report of anxiety and depression symptoms in younger children-Combined data set

	1	2	3	4	5	6	7	8
1. Self-reported separation anxiety	1	.47**	.39**	.72**	.31*	.17	.23	.27
2. Self-reported social anxiety		1	.78**	.90**	.22	.18	.15	.32*
3. Self-reported depression			1	.72**	.21	.14	.28	.23
4. Self-reported total trait anxiety (RCADS)				1	.25	.17	.12	.30*
5. Mother's report of child's separation anxiety					1	.38*	.46**	.76**
6. Mother's report of child's social anxiety						1	.51**	.74**
7. Mother's report of depression							1	.67**
8. Mother's report of total trait anxiety (RCADS)								1

*p<.05, ** p<.01(two-tailed)

Table G5

Correlations of self-report and mother's report of anxiety and depression symptoms in older children-Combined study

	1	2	3	4	5	6	7	8
1. Self-reported separation anxiety	1	.47**	.57**	.80**	.53**	.32*	.52**	.46**
2. Self-reported social anxiety		1	.49**	.76**	.30*	.39**	.29*	.36**
3. Self-reported depression			1	.69**	.36**	.26	.45**	.34*
4. Self-reported total trait anxiety (RCADS)				1	.47**	.37**	.47**	.47**
5. Mother's report of child's separation anxiety					1	.47**	.61**	.74**
6. Mother's report of child's social anxiety						1	.49**	.84**
7. Mother's report of depression							1	.66**
8. Mother's report of total trait anxiety (RCADS)								1

* $p<.05$, ** $p<.01$ (two-tailed)

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