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School of Psychology

Supporting Young People with Autism Spectrum Disorder to Attend Mainstream Schools: Evaluating Interventions that Target Key Areas.

by

Sarah Louise Fossey

Thesis for the degree of Doctorate in Educational Psychology

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UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF SOCIAL AND HUMAN SCIENCES

SCHOOL OF PSYCHOLOGY

Doctorate in Educational Psychology

SUPPORTING YOUNG PEOPLE WITH AUTISM SPECTRUM DISORDER TO ATTEND MAINSTREAM SCHOOLS: EVALUATING THE EFFECTIVENESS OF INTERVENTIONS THAT TARGET KEY AREAS.

Sarah Louise Fossey

Over the past decade there has been a growing drive towards inclusive education and increasing numbers of young people with Autism Spectrum Disorder (ASD) are now attending mainstream schools. Heightened responsibility has been placed on schools to provide effective, evidence-based interventions. A systematic review of the literature was conducted, exploring the effectiveness of interventions which target anxiety or social skills deficits for young people with ASD. A total of 31 studies were reviewed, all of which utilised a control-trial design and included participants aged 4-17 years old. The results indicated that studies within these areas demonstrate methodological quality and show consistency in findings. Implications for future research include the need to explore the effectiveness of school-based interventions, increased use of active control groups and the inclusion of combined interventions, targeting both social skills and anxiety.

The current empirical study evaluated the effectiveness of a school-based cognitive behavioural therapy (CBT) group intervention in reducing anxiety in adolescents with ASD. Parent, self and teacher-report anxiety was measured at pre, post and follow-up (6 weeks). In addition, social responsiveness, social worry, attentional control and attention to threat were measured at each time point. Thirty-five children (aged 11 - 14; IQ $\geq$70) with ASD and anxiety were randomly assigned to 6 sessions of the Exploring Feelings CBT intervention (n = 18) or a six week wait-list (n = 17). Participants in the intervention group experienced a significantly greater reduction in all three measures of anxiety than the wait-list group, with treatment gains largely maintained at follow-up. This reduction in anxiety was associated with improvements in teacher-reported social responsiveness and social worry. A significant group effect was also found for attentional control. The findings provide preliminary evidence to support the effectiveness of a school-based CBT intervention for reducing anxiety in young people with ASD.

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Declaration of Authorship

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

Supporting Young People with Autism Spectrum Disorder to Attend Mainstream Schools: Evaluating Interventions which Target Key Areas.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signed: .....

Date: .....

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Definitions and Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
ANOVA	Analysis of variance
ANCOVA	Analysis of co-variance
AS	Asperger's Syndrome
ASD	Autistic Spectrum Disorder
CBT	Cognitive Behavioural Therapy
DfE	Department of Education
DfEE	Department of Education and Employment
DSM5	Diagnostic and Statistical Manual of Mental Disorders
F	F distribution, Fisher's F ratio
HFA	High Functioning Autism
IQ	Overall Intelligence Quotient
M	Sample mean
N/ n	Number of cases/ studies
NICE	National Institute for Health and Clinical Excellence
ns	Not statistically significant
p	Probability
η_p^2	Partial-Eta-Squared Effect
PDD-NOS	Pervasive Developmental Disorder - Not Otherwise Specific
r	Estimate of the Pearson correlation coefficient
RCT	Randomised Control Trial
RT	Response time
SAS-TR	School Anxiety Scale - Teacher Rating
SD	Standard Deviation
SEN	Special Educational Needs
SCAS	Spence Children's Anxiety Scale
SCAS-P	Spence Children's Anxiety Scale - Parent
SCQ	Social Communication Questionnaire
SRS	Social Responsiveness Scale
SWQ-P	Social Worries Questionnaire - Pupil

SWQ-T	Social Worries Questionnaire - Teacher
t	The sample value of the t-test statistic
T1	**Time 1 (pre-intervention)**
T2	Time 2 (post-intervention)
T3	Time 3 (follow-up)
TAU	Treatment As Usual

Chapter 1

Evaluating the effectiveness of interventions for children and adolescents with Autism Spectrum Disorders that target two key areas: Anxiety and Social Skills.

It is estimated that approximately 1% of children and adolescents in the UK have Autism Spectrum Disorder (ASD; Baird et al., 2006). The Diagnostic and Statistical Manual of Mental Disorders (DSM5) defines ASD as a neurodevelopmental disorder characterised by persistent difficulties in social communication and social interaction, and restrictive, repetitive patterns of behaviour, interests or activities (American Psychiatric Association, APA, 2013).[1] Developments in educational policy emphasise the inclusion of pupils with Special Educational Needs (SEN) within mainstream classrooms, including those with ASD (DfES, 2001, 2004). A recent survey suggests that 60% of children with ASD are currently educated in mainstream settings (Waddington & Reed, 2010).

Whilst inclusion is often cited as promoting quality of life, improved educational performance and increased opportunity for social development (Knight, Petrie, Zuurmond & Potts, 2009; Osborne & Reed, 2011; Starr, Foy, & Cramer, 2001), there remain concerns regarding the efficacy of this policy for young people with ASD. Recent studies suggest that the social and emotional behaviour improvement made by pupils with ASD in mainstream educational settings is not as marked as that made by those in specialist provisions (Panerai et al., 2009; Reed, Osborne & Waddington, 2012). Moreover, qualitative investigations show that pupils with ASD can find inclusive education stressful and anxiety-provoking (Browning, Osborne & Reed, 2009; Connor, 2000; Humphrey & Lewis, 2008). Given the range of difficulties experienced by children with ASD, it is important to determine the most pressing areas to target for intervention and to determine methods that are most appropriate for this population. Two areas prominently explored are social deficits and anxiety, with research suggesting that the atypical social behaviour evident in pupils with ASD who attend mainstream schools, combined with elevated anxiety, has the potential to impact upon

[1] This spectrum model of ASD proposes that the level of symptomology falls on a continuum with three defined levels of severity and it encompasses the previously identified group of disorders which included Autistic Disorder, Asperger's Disorder and Pervasive Developmental Disorder - Not Otherwise Specific (PDD-NOS; APA, 2000).

both social and academic success (Ashburner, Ziviani & Rodger 2010; Barnard, Prior & Potter, 2000; Osborne & Reed, 2011).

Social Skill Deficits

Social skill deficits are a fundamental area of impairment for youth with ASD and remain a high treatment priority (Weiss & Harris, 2001). Individuals with ASD can experience difficulty in communicating with others, processing and integrating information and establishing and sustaining social relationships (Bellini, Peters, Benner & Hopf, 2007). These social challenges are often compounded by difficulties with pragmatic communication (Klin, McPartland &Volkmar, 2005), a tendency to engage in restrictive, repetitive behaviours (Thomeer et al., 2012; Winter-Messiers, 2007) and an inability to interpret non-verbal cues (Lindner & Rosen, 2006). Social difficulties are evident with peers as early as preschool (Paul, 2003) and have been found to become more pronounced over time as the complexity of peer social interactions increase (Chamberlain et al., 2007). Despite a desire for social relationships, many young people with ASD experience more social isolation, rejection and loneliness than their typically developing peers (Bauminger & Kasari, 2000; Barnhill et al., 2002; Chamberlain, 2001; Church et al., 2000). There is also evidence that social skill deficits in young people with ASD contribute to academic under-achievement (Howlin & Goode,1998), mood and anxiety problems (Myles, 2003; Myles, Bock, & Simpson, 2001; Tantam, 2003) and employment difficulties and comorbid psychiatric disorders during adulthood (Barnhill, 2007; Howlin et al., 1998).

Anxiety

Anxiety in typically developing children and adolescents. Anxiety disorders are among the most prevalent forms of childhood psychopathology, affecting between 8% and 22% of children and adolescents (Costello, 2004; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; McLoone, Hudson, & Rapee, 2006; Miller, 2008). Anxiety disorders differ from developmentally normal fear or anxiety by being 'excessive' or 'persisting beyond developmentally appropriate periods' (APA, 2013). Longitudinal

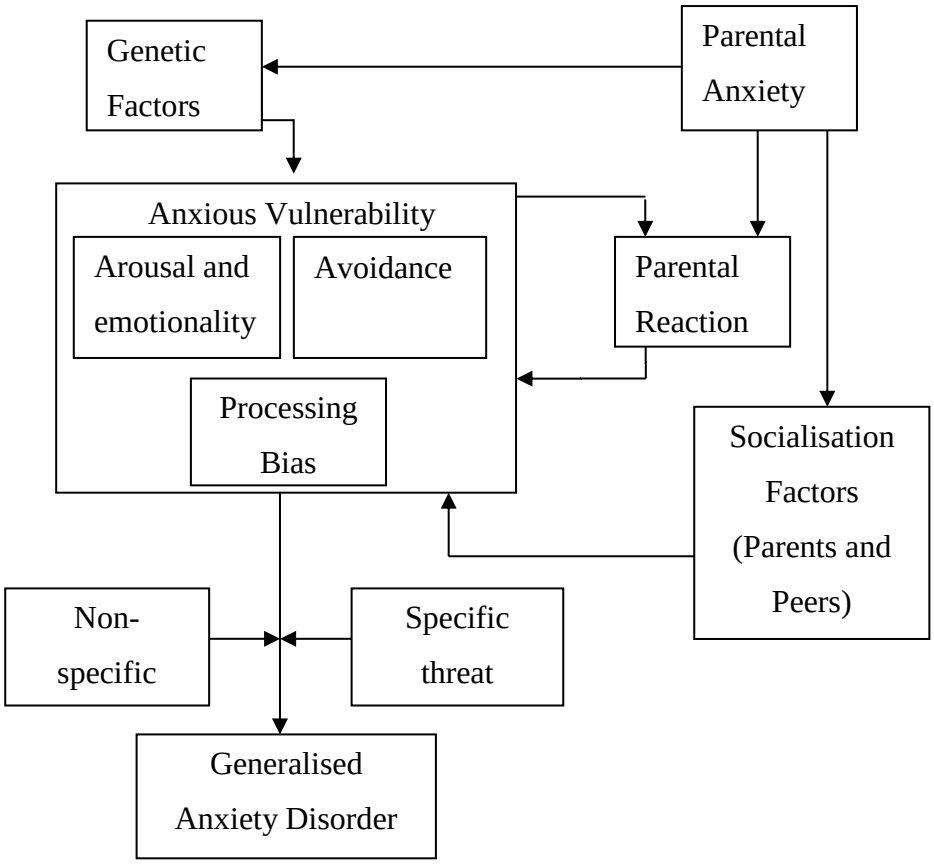

Figure 1. A representation of Rapee's (2001) theoretical framework of anxiety. (Reproduced from 'The development of generalized anxiety disorder'. In M. W. Vasey & M. R. Dadds (Eds.), The developmental psychopathology of anxiety, p .49).

study has shown that anxiety often remains stable across childhood and adolescence (Gregory et al., 2007), and if left untreated, it can follow a chronic course into adulthood (Albano, Chorpita & Barlow, 2003)[2].

Developmental pathways to childhood anxiety. Theoretical frameworks have highlighted both genetic and environmental influences on the development of anxiety in young people. A wealth of data has supported the heritability of anxiety (for a review see Hettema et al., 2001). Research into the genetic vulnerability associated with childhood anxiety has widely explored temperament, with studies collectively showing

[2] The current diagnostic system distinguishes between a number of types of anxiety disorder, including separation anxiety disorder, social anxiety disorder, panic disorder and generalised anxiety disorder. The age of onset, developmental course and prognosis differ among the various types of anxiety (MacNeil, Lopes & Minnes, 2009; Weems & Costa, 2005)

children and adolescents who score highly on neuroticism and negative affect to be more susceptible to the development of internalising symptoms, including anxiety (Lonigan & Phillps, 2001; Rapee & Szollos, 1997). The role of behavioural inhibition has also been explored, identifying that young people who show this behavioural tendency are at greater risk of experiencing anxiety symptomology (Kagan & Snidman, 1991; Fox & Calkins, 1993).

Research has also highlighted links between parenting style and childhood anxiety, with parents of anxious children exhibiting parenting styles characterised by over-protection and over-control (Rapee, 1997; Wood et al., 2003). Furthermore, specific learning experiences during development have been shown to contribute to the development of anxiety, with several studies reporting the importance of direct conditioning experiences and modelling of threat (King et al. 1997; Merckelbach et al. 1996; Muris et al. 1997). Considering cognitive processing, research has also reliably demonstrated the presence of information processing biases in anxious young people, characterized by biases toward threat in the form of attentional allocation, interpretation of ambiguity, and estimates of danger (for review see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg & van IJzendoorn, 2007). This fits with research exploring the neurodevelopment of childhood anxiety disorders which suggests that the amygdala plays a central role in the detection and response to threat (Zald, 2003). Amygdala over-activation is thought to lead to over-encoding and over-generalisation of the fear response (Green & Ben-Sasson, 2010), with total amygdala volumes found to be significantly larger in children with generalized anxiety disorder (De Bellis et al., 2000).

It is now widely accepted that the development of anxiety symptoms in childhood reflects an interaction between genetic vulnerability and environmental factors. Risk factors are often explored within a framework which considers both moderating and mediating factors (Degnan, Almas & Fox, 2010). For example, theoretical frameworks such as that proposed by Rapee (2001; Figure 1), have taken an integrative and multifactorial approach to understanding the development of childhood anxiety. Rapee proposed that children with a genetic vulnerability to anxiety are likely to exhibit high levels of arousal, emotionality and cognitive bias. This vulnerability and the development of anxiety are then impacted by environmental risk factors, with emphasis placed upon the role of parenting and socialisation more broadly.

Anxiety in children and adolescents with Autism Spectrum Disorder.

Anxiety-related concerns are among the most common presenting comorbid difficulties for young people with ASD (Ghaziuddin, 2002) and the prevalence of anxiety disorders within this population has been examined in a number of studies. White, Oswald, Ollendick and Scahill (2009) reviewed 11 studies and reported that between 11% and 84% of young people with ASD experience some degree of anxiety. They highlighted that there are many unanswered questions about the presentation and course of anxiety in children with ASD. The large range in prevalence between studies is thought to reflect the varying definitions of, and methods used to measure, anxiety (Lang, Regester, Lauderdale, Ashbaugh & Haring, 2010). Research has shown that the prevalence of anxiety among children with ASD is greater than in typically developing children (Bellini, 2004; Farrugia & Hudson, 2006; Kim et al., 2000) and children with specific learning difficulties (Gillot, Furniss & Water, 2001). When present, anxiety may intensify the social and functional impairment experienced by young people with ASD, exacerbating the core-deficits (Myles, Barnhill, Hagiwara, Griswold & Simpson, 2001; Reaven, 2011). Furthermore, the presence of anxiety symptomology in young people with ASD is reported to have a detrimental impact on peer relationships (Sze & Wood, 2007), academic achievement (Ashburner et al., 2010), social responsiveness (Sukhodolsky et al., 2008) and attention control (Ashburner et al., 2010).

Consistent with frameworks to understand the development of anxiety in a typical population, several models have been offered to explain the causal pathways linked to risk factors for anxiety in young people with ASD. Similar to theoretical frameworks proposed for typically developing children, some researchers have highlighted temperamental risk, suggesting that young people with ASD may be behaviourally inhibited (Bellini, 2006). There is also evidence that children with ASD have increased amygdala volumes compared to typically developing children and that amygdala size is positively correlated with fear and anxiety, after controlling for age, brain size and severity of ASD symptoms (Juranek et al., 2006). As in typically developing young people, studies have also found an association between anxiety symptoms and negative automatic thoughts in young people with ASD. A recent study by Farrugia and Hudson (2006) found the presence of negative thoughts to be significantly higher in a sample of anxious adolescents with ASD, in comparison to a sample of adolescents with anxiety disorders and a non-clinical sample.

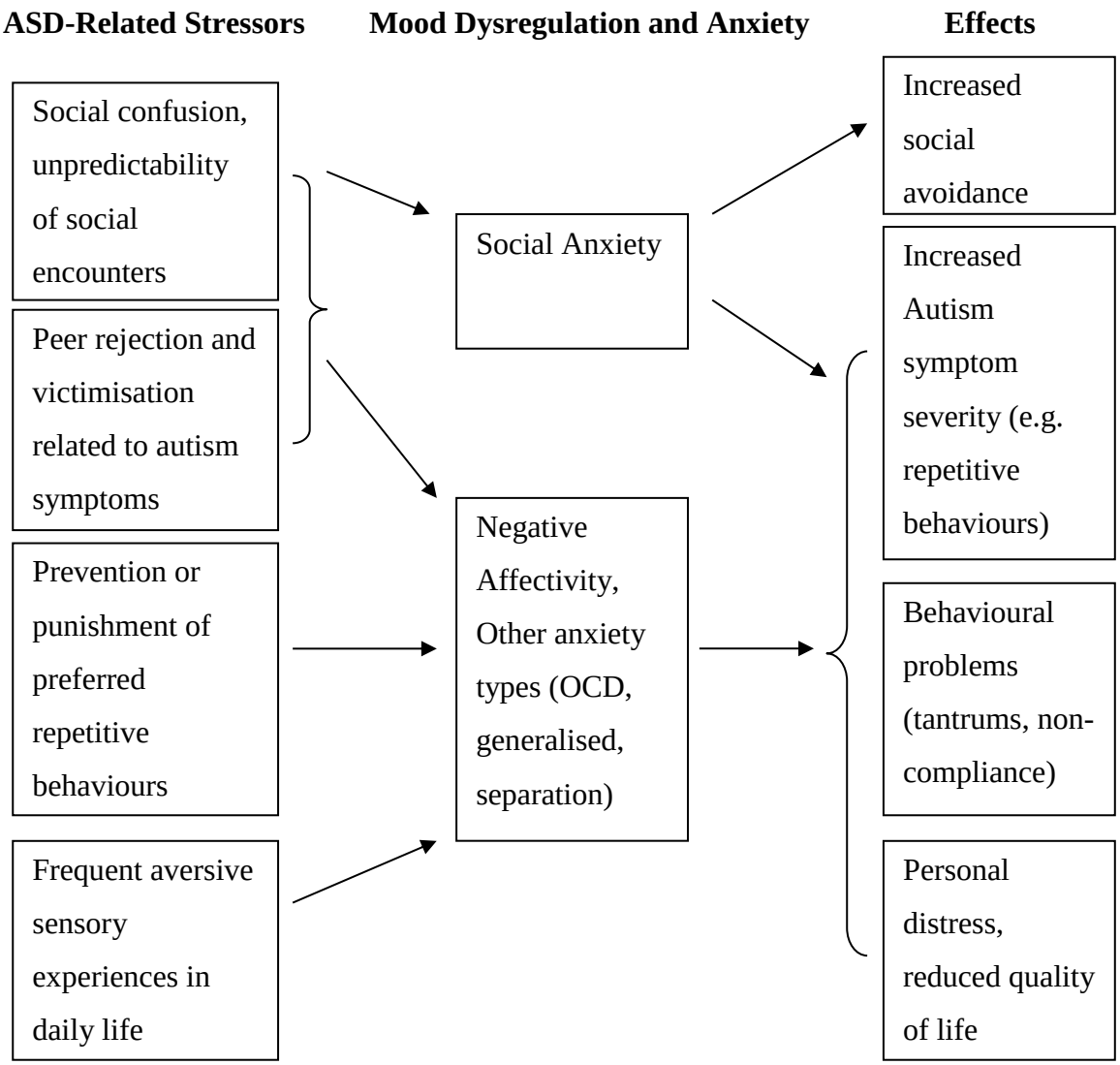

Figure 2. Hypothetical model of clinical anxiety in autism spectrum disorders (Reproduced from Wood & Gadow, 2010, p. 287).

Research has also explored specific links between anxiety and ASD impairment, considering those risk factors that may be more unique to this population. Research has shown that parent-rated anxiety is linked to core features of ASD including degree of social impairment (Bellini, 2004; Bellini, 2006), social responsiveness (Sukhodlsky, et al., 2008) and the presence of repetitive behaviours and interests (Sukhodolsky et al., 2008). Researchers have also found positive correlations between sensory over-responsivity and anxiety in young people with ASD (Liss, Saulnier, Fein & Kinsbourne,

2006), referring to a strong reaction to sensory stimuli in the environment (Bundy, Lane, & Murray, 2002; Pfeiffer, Kinnealey, Reed & Herzberg, 2005). However, which causal mechanisms may exist between sensory over-responsivity and anxiety remain unclear (for a review see Green & Ben-Sasson, 2010). On the subject of overall impairment, Kelly, Garnett, Atwood and Peterson (2008) found higher anxiety levels to be associated with greater ASD severity, consistent with the possibility that as anxiety increases, so do the core features of ASD.

Based on these findings, Wood and Gadow (2010) suggest the possibility of a causal relationship between anxiety and ASD symptom severity and propose a hypothetical model of the role of anxiety in ASD (see Figure 2). Whilst this model shows similarity to Rapee's (2001) framework for typically developing young people, with the inclusion of a vulnerability to anxiety, the presence of stressors and specific threat experiences and a strong emphasis on socialisation factors, it also uniquely incorporates the role of specific impairments linked to ASD. Within the framework, ASD symptoms are viewed as potential stressors, resulting from a conflict between symptom expression and social expectations or demands. The model proposes a bi-directional relationship between ASD impairment and anxiety, with severity of ASD impairment proposed to both precede and potentially increase following anxiety. ASD-related stressors are suggested to contribute to negative affectivity, this then impacting upon overall functioning. The model separates the pathways to specific types of anxiety, suggesting that differing risk factors will precede differing types of anxiety.

In addition to the more generic factors which place young people with ASD at risk of anxiety, this model allows consideration of the role of ecological and contextual factors specific to the schooling environment. Negative peer relationships, related to specific ASD symptoms, are identified as a possible ASD-stressor in the model. With children and adolescents with ASD typically experiencing difficulties with social interaction and communication, the literature also highlights an evident vulnerability to social exclusion and negative social experiences, including bullying (Ashburner et al., 2010). Studies have consistently reported a significantly higher frequency of bullying among pupils with ASD compared to their age and gender matched peers without SEN (Humphrey & Symes, 2010; Rowley et al., 2012; Wainscot, Naylor, Sutcliffe, Tantam & Williams, 2008). Bullying in childhood has been found to predict anxiety later in life,

both in the general (Roth, Coles & Heimberg, 2002) and ASD populations (Dodd, 2005; Green, Gilchrist, Burton & Cox, 2000; Mishna, 2003).

The model further suggests that social anxiety could be a contributory or even primary determinant of socially avoidant behaviour for some children with ASD (Wood & Gadow, 2010). Supporting this proposition, recent research has demonstrated that excessive worry and distress regarding social situations can further prevent the establishment of meaningful social relationships for young people with ASD, leading to social isolation (Bellini, 2006). This can be linked to the model of social-information processing developed by Crick and Dodge (1994) which proposes that the interpretation of social messages determines social response.

Finally, reference is also made to the impact of aversive sensory experiences. In support, a qualitative exploration of the views of pupils with ASD in mainstream secondary schools identified a lack of predictability and order within the mainstream school environment to be a source of considerable stress and anxiety (Humphrey & Lewis, 2008). Recent estimates show that between 45% and 96% of ASD children experience difficulty processing, integrating and responding to sensory stimuli (Ben-Sasson et al., 2009; Lane, 2010). Mainstream classrooms are typically complex and overwhelming sensory environments (Mesibov & Shea, 1996) and interventions are needed to support pupils with ASD to manage this.

Aims and Objectives of the Current Review

The aim of the current paper is to provide a systematic review of the effectiveness of interventions which target anxiety or social skills deficits for young people with ASD. Given both the increasing numbers of young people with ASD who are now being placed within mainstream school settings and the need to address the pertinent issues which impact upon their successful inclusion, this review will be important in providing a critical overview of the current evidence-base. The review will further aim to consider both the feasibility and efficacy of interventions and the implications of findings for schools, considering current roles and future directions. Although research suggests that anxiety and social skills deficits should not be viewed as independent risk factors, with anxiety considered to amplify core social deficits (White et al., 2013), research has yet to adequately explore interventions which concurrently target social deficits and anxiety

in young people with ASD. This review will therefore explore interventions which target anxiety and interventions which target social skills independently in this population. A critical assessment of the reviewed studies' methodological quality will be conducted.

Method

Data Sources and Search Strategy

Searches were conducted in four electronic databases: Psychinfo via EBSCO (1983-2014); Web of Science via Web of Knowledge (1970 - 2014); EMBASE via OVID (1980 - 2014) and Medline via EBSCO (1979 - 2014) between December 2013 and February 2014. The search terms used were "Autism" OR "Asperger's Syndrome" OR "Pervasive Development Disorder"; "Intervention" OR "Therapy" OR "Treatment"; "Anxiety" OR "Worry"; "Social Skills" OR "Social Skills Training" OR "Social Competence"; "Childhood" OR "Children" OR "Adolescence". Different combinations of the search terms were explored using AND. The search terms included a list of key words generated by the author and from the thesaurus tool within each database. Additional words were identified from key papers found during the literature search. Additional articles were obtained by conducting a manual search both of meta-analyses found during the literature search and of the reference lists of publications identified as eligible for inclusion in the review. The initial database search retrieved 1046 records. In accordance with pre-defined inclusion and exclusion criteria, titles and abstracts were scanned for relevance and 1004 records were subsequently excluded. Full text was retrieved for 42 publications, and of these, 31 were deemed to meet criteria for inclusion in the current literature review. A flow diagram of the search process is shown in Figure 3.

Inclusion and Exclusion Criteria

Participants. Studies were included if participants were school aged (4 - 18 years) and attended a mainstream or special school. To be eligible for inclusion, participants were required to have a confirmed diagnosis of Autism Spectrum Disorder. Studies were included if participants were targeted on the basis of displaying symptoms of anxiety or limited social skills.

Study design. Studies were eligible for inclusion if they used a quantitative methodology. This included randomised controlled trials (RCTs), quasi-experimental designs, open trials, pilot studies and feasibility studies. Studies were excluded if they did not include an active, passive (wait-list or no intervention) or matched control

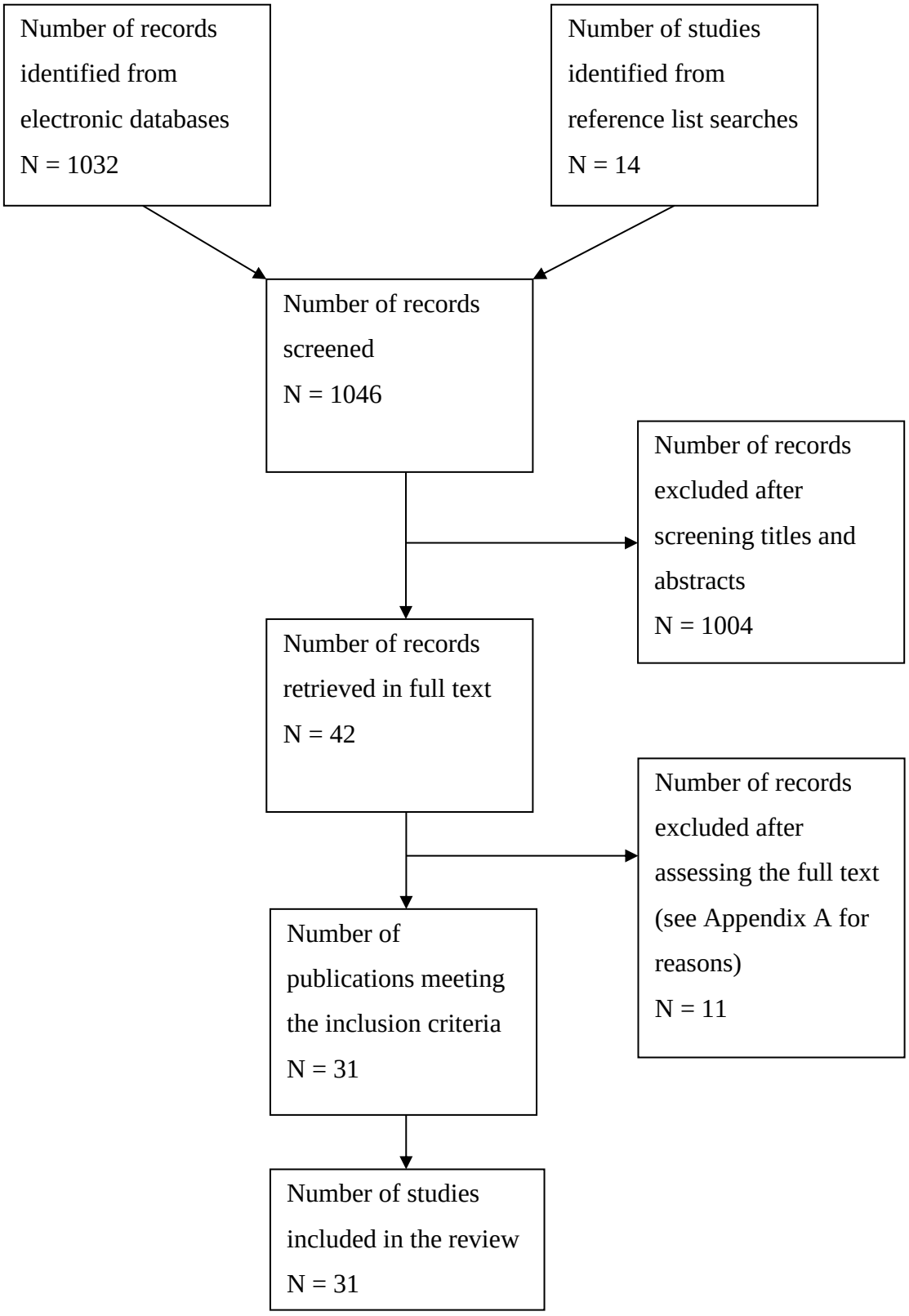

Figure 3. Flowchart of inclusion and exclusion of records from the systematic review.

group. Case studies and single-subject design studies were excluded, with a minimum of ten participants required in each study.

Type of intervention and context. The intervention was eligible for inclusion if it targeted anxiety or social skills, and was specifically aimed at children and adolescents with ASD. Interventions delivered in a school, clinic or other setting were included, provided they were delivered with a consistent frequency and content for all participants. Interventions were included if they targeted functions and skills related to anxiety reduction or social skills development. This included, but was not limited to, Cognitive Behavioural Therapy (CBT). Individual, group and computer-based interventions were included in this review, as were interventions delivered in any country.

Outcome variables and analysis. Only studies that included anxiety or social skills as a primary outcome measure were eligible for inclusion in the review. Studies using self-reports and/or parent, teacher or clinician reports were eligible for inclusion. Studies were excluded if there was no evidence of group-based quantitative analysis. Studies were eligible for inclusion if they contained a between group (experimental vs. control) and/or within group (pre vs. post-intervention) analysis of the main outcome variables.

Publication requirements. Empirical studies were only eligible for inclusion if they were published in peer reviewed journals and were written in English. Therefore, unpublished work such as dissertations, book chapters, abstracts and conference proceedings were excluded. Review articles were also excluded.

Data Extraction and Synthesis

The data extracted from eligible papers included: study design, descriptive information about participants (age, gender, characteristics), descriptive information about the intervention (method and frequency of delivery, content, duration), outcome measures (including reliability and validity) and key results, both between and within experimental and control groups over time (see Appendix B and C). As well as reported group differences, where available, the impact on clinical or diagnostic status was also

reported. Studies are organised by primary outcome (anxiety or social skills) and are presented on chronological descending order within these groups.

Quality Assessment

The quality of eligible studies was assessed using a checklist devised by Downs and Black (1998), which provides a framework through which to assess the methodological quality both of randomised and non-randomised studies of health care interventions. It consists of 27 items split into five subscales: 1) reporting , 2) external validity, 3) internal validity, 4) confounding bias and 5) power. Although the checklist may be used to numerically score the quality of studies, Booth, Papaioannou and Sutton (2012) caution against the use of such a system, questioning its usefulness in truly understanding the validity of research findings. Therefore, in the current review the checklist was used to produce a descriptive summary of the overall quality of studies, considering common strengths and weaknesses.

Results

The database search identified a total of 31 records for all types of intervention (Anxiety: 10; see Appendix B & Social Skills: 21; see Appendix C).

Studies investigating interventions aimed at addressing Anxiety Symptomology

Sample Characteristics. Collectively, the ten studies provided intervention to 221 participants, with a further 199 participants in control groups. The sample size of individual studies ranged from 12 to 71. The age range of participants varied from 7 to 17 years old. The majority of participants were male (89%). All participants had an ASD diagnosis (Autism 42%, PDD-NOS 22%, Asperger's Syndrome 46%). In the majority of studies (n = 8) this diagnosis was verified through the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2000) and the Autism Diagnostic Interview-Revised (ADI-R; Rutter et al., 2003). In the remaining studies, telephone interviews, parent checklists (Childhood Autism Screening Test, CAST, Scott et al., 2002; Social Communication Questionnaire, SCQ, Rutter, Bailey & Lord, 2003) and clinical observations were used to validate diagnosis. All participants were reported to have a full or verbal IQ of >70. In six of the studies, participants met criteria for at least one anxiety disorder, confirmed through a clinician administered interview (Anxiety Disorders Interview Schedule: Child and Parent versions; ADIS-C/P, Silverman & Albano, 1996). In the remaining studies, clinically significant symptoms of anxiety were confirmed through participants exceeding the cut-off on a parent-report measure (n = 2), via semi-structured parent interview (n = 1) or by confirmation that participants were attending a treatment clinic for anxiety related issues (n = 1). Ethnicity and socio-demographic status was inconsistently reported. Studies were conducted in the United States of America (n = 7), Australia (n = 2) and Singapore (n = 1).

Study Design. All of the studies were RCTs using an active intervention control (n = 1), treatment-as-usual control (n = 3), or wait-list control (n = 5), with the exception of one study which used a quasi-experimental design (Reaven et al., 2009). Five studies used two time points (pre and post-testing) to assess intervention effects. The remaining studies conducted a follow up assessment: after six weeks (Sofronoff, Atwood & Hinton, 2005), two months (McNally, Lincoln, Brown & Chavira, 2013),

three months (Storch et al., 2013; Wood et al., 2009) and three months and six months (Sung et al., 2011).

Intervention

Content. All ten studies investigated the effectiveness of manualized interventions which were based on a CBT framework. CBT is an empirically supported therapeutic intervention initially developed by Beck, Rush, Shaw and Emery (1979). It has a primary aim to encourage individuals to link thoughts, feelings and behaviours to develop effective behaviours. Across the studies, seven different interventions were implemented: Coping Cat (*n* = 1; McNally et al., 2012), Building Confidence (*n* = 2; Fujii et al., 2012; Wood et al., 2009), Facing Your Fears (FYF, *n* = 2; Reaven et al., 2009; Reaven et al., 2012), Cool Kids (*n* = 1; Chalfant et al., 2007), Behavioural Interventions for Anxiety in Children (BIACA, n = 1; Storch et al., 2013), Exploring Feelings (*n* = 1; Sofronoff et al., 2005) and Multimodal Anxiety and Social Skill Intervention (MASSI, *n* = 1; White et al., 2013). One study also described a more bespoke intervention, combining key aspects from a number of different interventions (Sung et al., 2011). All interventions focused on treating the main components of anxiety rather than on treating specific disorders. The majority of interventions included two stages: skills teaching and exposure. Skills teaching included affective education, cognitive restructuring and the development of a coping plan. The exposure component included in vivo exposure to fear stimuli.

Four of the interventions were reported to have been specifically designed for young people with ASD (Reaven et al., 2012; Sofronoff et al., 2005; Storch et al., 2013; White et al., 2013). The remaining four programmes were adapted from current interventions, with increased length of programme and individual session duration, inclusion of visual aids, reduced emphasis on communication skills, incorporation of children's specific interests and sensory input. Four of the interventions additionally focused on the development of social skills (Fujii et al., 2013; Reaven et al., 2012; White et al., 2013; Wood et al., 2009) and one included tasks aimed at building independence and self-help skills (Wood et al., 2009). Only one study reported the inclusion of a school-intervention module, through which children were taught

friendship skills and were given additional coaching by available school providers (Wood et al., 2009).

Delivery. The number of sessions delivered within each intervention ranged from 6 to 32 (M = 15), with sessions delivered weekly and lasting between 60 and 120 minutes. One intervention included three, monthly booster sessions (Chalfant et al., 2007). Six of the interventions incorporated an integrated, family-based approach (Fujii et al., 2013; Reaven et al., 2009; Reaven et al., 2012; Storch et al., 2013; White et al., 2013; Wood et al., 2009). These included individual child and parent sessions, small and large group sessions and parent-child dyadic working. The core components of the parent modules included psycho-education, parent coaching to support child participation, parent/school advocacy support and exposure therapy planning. Three of the interventions consisted of small group working with three to six participants within each group (Chalfant et al., 2007; Sofronoff et al., 2005; Sung et al., 2011) and one of individual child-therapist sessions (McNally et al., 2013). Of these four studies, three included concurrent parent discussion sessions. Sofronoff, Attwood and Hinton (2005) compared two experimental groups for the same intervention; one involving children only and the second including parent involvement.

Five of the interventions were delivered by clinical psychologists, three by therapists and two by postgraduate psychologists. Six of the studies reported that therapists had undergone training, although the time of this instruction was inconsistently reported. Homework was included in four of the interventions. Three of the interventions took a flexible, modular format, delivered based upon the individual child's needs. Only one study included teacher involvement, as well as a peer buddy system (Fujii et al., 2013). In two of the studies, involvement was reinforced through monetary rewards (McNalley et al, 2013) or a token reward system (Reaven et al., 2012). Five of the interventions were delivered in clinic or research settings, the remainder did not specify. For the one study which included an active control group (Sung et al., 2011), participants received a small-group, manualized Social Recreational (SR) programme. Individual activities were aimed at fostering self-development skills, self-engagement behaviours and motor coordination skills.

Measures

Anxiety was included as a primary outcome measure in all ten studies. Seven studies utilised both self-report and parent-report, two studies measured parent-report only and one study measured only self-report. The majority of measures used utilised a likert-type rating scale and used total report scores to assess anxiety symptoms. The most common self-report measures used were the Spence Children's Anxiety Scale (SCAS; Spence, 1998; *n* = 3) and the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978; *n* = 2). In one study (Sofronoff, Attwood & Hinton, 2005), the SCAS was administered at pre-intervention only and the authors reported that significant difficulty was experienced in gaining anxiety-related information from child informants. The most common parent-report measures were the Spence Child Anxiety Scale - Parent (SCAS-P, Nauta et al., 2004; *n* = 3) and the parent version of the SCARED (Birmaher et al., 1997; *n* = 2). Five studies also conducted clinical interviews as an outcome measure, using the ADIS-C/P (Silverman & Albano, 1996).

Some studies also measured secondary outcomes including social responsiveness (*n* = 2), externalising and internalising symptoms (*n* = 3), social worries (*n* = 1), automatic thoughts (*n* = 1) and levels of impairment across interpersonal, social and academic domains (*n* = 1). Six studies also used the Clinical Global Impression - Severity and Improvement (CGI-Severity, CGI-Improvement; Guy, 1976) to measure clinician ratings of the global severity of anxiety and clinical improvement of anxiety and score treatment response. Children receiving a score of completely recovered, very much better or much better were considered positive treatment responders.

Outcomes

Parent Ratings. In five of the seven studies which measured parent-reports of anxiety, children in the active treatment group experienced a significant decrease in the severity of anxiety symptoms post-treatment, in comparison to a control group (Chalfant et al., 2007; McNally et al., 2013; Reaven et al., 2009; Sofronoff et al., 2005; Wood et al., 2009). Sofronoff et al (2005) reported a greater decrease in anxiety with parent involvement (versus a child-only intervention), although raters were not blind to

treatment status. The remaining two studies did not report significant group differences from parent-report measure.

Child Ratings. Only one study (out of six) reported a significantly greater reduction in self-reported anxiety post-treatment, in comparison to a control group (Chalfant et al., 2007). The remaining studies reported either no significant effects (McNally et al., 2013; Reaven et al., 2009; Storch et al., 2013) or a significant time effect only (Wood et al., 2009). Similarly, in the only study to use an active control group, Sung et al (2011) found no significant group difference in self-report anxiety. There was a main effect of time, highlighting that self-report anxiety improved in both the treatment (19%) and active control (16%) groups post-intervention. The findings suggest that common elements in sessions (i.e. structured, regular sessions with a consistent therapist) can help with the management of anxiety in children with ASD.

Clinician ratings. Clinician ratings generally demonstrated positive outcomes following treatment. Four studies reported a significant reduction in anxiety symptoms post-intervention (versus control group), with large treatment effects (1.15, McNally et al., 2013; 0.85, Reaven et al., 2012; 1.03, Storch et al., 2013; 2.46, Wood et al., 2009). Five studies examined diagnostic status post-intervention and reported that a significant proportion of participants no longer met diagnostic criteria for their primary anxiety disorder and achieved clinical remission (Range = 38% - 71.4%; Chalfant et al., 2007; Fujii et al., 2013; McNally et al., 2013; Storch et al., 2013; Wood et al., 2009). The majority of children in the passive control groups continued to meet diagnostic criteria, with only a small number achieving clinical remission (Range = 0% - 9.1%). Similarly, a significantly greater positive treatment response was reported for the intervention groups (Range = 40 % - 92.9%) compared with control groups (Range = 8.7% - 20%) in three studies (Reaven et al., 2012; White et al., 2013; Wood et al., 2009). In contrast, only one study did not report a difference in the severity of anxiety change between intervention and control groups (Sung et al., 2011). For the majority of studies (n = 6), clinicians were blind to condition.

Secondary Measures. Chalfant et al (2007) measured parent and teacher-reports of behavioural difficulties (internalising and externalising symptoms) and found a significantly greater reduction in these symptoms for children in the intervention (versus the wait-list control) group. A similar group effect was found for self-reported negative

thoughts, with significant reductions reported for the intervention group only. Sofronoff et al (2005) asked participants to generate anxiety coping strategies and significantly more strategies were generated by the intervention group post-intervention. Two studies measured more general impairment levels (across interpersonal, social and academic domains) and reported that children in the intervention groups demonstrated greater improvements than those in the control group (Storch et al., 2013; White et al., 2013). These studies also reported a similar finding for social responsiveness.

Follow-up. Follow-up measures were administered in five studies. Reaven et al. (2012) and Storch et al. (2013) reported that for those returning the follow-up measures, post-intervention reductions in anxiety levels were largely maintained at both three and six month follow-up. Considering diagnosis status, Wood et al (2009) reported that 80% of children remained diagnosis free three months after intervention completion, with 90% retaining a positive response to the treatment. McNally et al (2013) reported that although only 36% of participants remained free from meeting diagnostic criteria for their primary anxiety diagnosis at two month follow up, statistical differences in anxiety scores from pre-treatment to follow-up suggest that treatment gains were maintained. The authors suggest that children with ASD may require a booster session to fully maintain skills learned. Finally, Sofronoff et al (2005) reported that whilst for some participants a significant change from pre-intervention to post-intervention was reported, in many cases there was no significant change until the six week follow-up. The authors suggested that implementation of the taught strategies took longer and therefore increased the time before anxiety symptom reduction was reported.

Summary

Ten studies involving young people with ASD who received an intervention for the treatment of anxiety were reviewed. Whilst all studies evaluated the effectiveness of interventions developed based upon a CBT framework, the length and frequency of interventions varied substantially. Analysis across studies suggests that CBT is an effective intervention for the treatment of anxiety within this population, with significant reductions in anxiety symptomology as reported by both parents and clinicians. The findings from child-reports were less consistent and often did not correspond to parent-reports. Previous research does however suggest that although

self-report instruments may provide useful information in the existence of psychiatric co-morbidities in ASD, caution must be exercised in their interpretation (Mazefsky, Kao & Oswald, 2011) . The studies that used follow-up measures largely reported positive findings, with treatment outcomes maintained. Considering the broader impact of the CBT interventions, improvements were reported in behavioural difficulties more generally and social skills.

Studies investigating interventions aimed at addressing Social Skill Deficits

Sample Characteristics. The 21 studies provided intervention to 484 participants, with a further 367 participants in control groups. The sample size of individual studies ranged from 12 to 117. The age range of participants varied from 4 to 17 years old and the majority were male (83.8%). All participants were reported to have an ASD diagnosis (ASD 42%, PDD-NOS 14% & Asperger's syndrome, 44%). In six of the studies, this diagnosis was verified through the ADOS (Lord et al., 2000) and the ADI-R (Rutter et al., 2003). In five of the studies, parent checklists were used to confirm that participants met research criteria for diagnosis. The remaining 14 studies were reliant on a pre-existing diagnosis. None of the studies specified social skills deficits within the inclusion criteria. In 14 studies, participants had a full or verbal IQ of >70. Socio-demographic status was inconsistently reported. Of the 12 studies who reported ethnicity, a significant proportion of participants were Caucasian. Studies were conducted in the United States of America (*n* = 17), Australia (*n* = 2), United Kingdom (*n* = 1) and Canada (*n* = 1).

Study Design. All of the studies were controlled trials using an active intervention control (*n* = 6), treatment-as-usual control (*n* = 3), wait-list control (*n* = 9) or a factorial design, including an active and wait-list control group (*n* = 3). LeGoff (2004) utilised a cross-over design in which participants served as their own control. Ten studies used a quasi-experimental design through which participants were assigned in blocks based on parent availability (*n* =1), matched (*n* = 2) or stratified by language levels, overall functioning, age, gender or ethnicity (*n* = 8). One study utilised a non-equivalent control group of typically developing children (Cotungo, 2009). Thirteen studies used two time points (pre and post-testing) to assess intervention effects, whereas eight studies assessed follow up: after three months (Castorina & Negri, 2011; Frankel et al., 2010; Kasari, Rotheram-Fuller, Locke & Gulsrud, 2012; Thomeer et al.,

2012), 14 weeks (Laugeson et al., 2012) and five months (Beaumont & Sofronoff, 2008). Lerner, Mikami and Levine (2011) carried out testing at seven time points (pre, during and post-intervention).

Intervention

Content. Of the 21 interventions targeting social skills as a primary area, 13 were based primarily on a social learning theory (SLT; Bandura, 1977) framework, and eight took a multifaceted approach, combining elements of SLT with a CBT framework, direct teaching with modelling, coaching and therapeutic activity. In seven of the studies, manualized, published interventions were implemented: The Program for the Education and Enrichment of Relational Skills (PEERS; Laugeson & Frankel, 2010; *n* = 2), The Children's Friendship Training (CFT; Frankel & Myatt, 2003; *n* = 1), The Social Skills Training Package (Spence, 1995; *n* = 1), Sociodramatic Affective Relational Intervention (SDARI; Lerner& Levine, 2007; *n* = 2) and the Social Skills Group Intervention (SSGI; DeRosier, 2002; *n* = 1). For the majority, adaptations were made to ensure their suitability and effectiveness for the ASD population. Four studies (Lerner & Mikami, 2012; Lopata et al., 2006; Lopata et al., 2008; Lopata et al., 2010) structured social skills groups based on the commercially available nine-step Skillstreaming programme (Goldstein & McGinnis, 1997). Five studies described bespoke interventions (Castorina & Negri, 2011; Cotugno, 2009; Koenig et al., 2010; Kroeger et al., 2007; Thomeer et al., 2012). Three studies investigated the effectiveness of the Lego Therapy approach, with Lego-based interactive play groups used to support social development (LeGoff, 2004; LeGoff & Sherman, 2006; Owens et al., 2008). The final two studies implemented computer-based interventions (Beaumont & Sofronoff, 2008; Hopkins et al., 2011). The majority of interventions included two stages within each session: skills teaching through didactic instruction and active practice (*n* = 16). For the studies which included an active control group, participants received a range of comparable manualized interventions or engaged in free-play sessions.

Delivery. The number of sessions delivered within each intervention ranged from 7 to 30 (*M* = 17). The majority of sessions were delivered once or twice weekly (*n* = 16), each lasting between 10 and 120 minutes. In five studies, participants attended several shorter sessions on a daily basis for a number of consecutive weeks. Eight of the

studies involved parents through concurrent or intermittent parent teaching sessions. In the only study to report school involvement, teacher hand-outs were distributed (Beaumont & Sofronoff, 2008). Nineteen of the interventions were group based, with group sizes ranging from three to ten. The studies were inconsistent in reporting who had delivered the interventions or what prior training they had completed. Homework was included in five of the interventions. In nine of the studies, participants received rewards for their participation. Of those who reported location, seven of the interventions were delivered in clinic or research settings, five in college campuses and only one at a school (Hopkins et al., 2011).

Measures

In all 21 studies, social skills were measured as a primary outcome through a variety of measures including questionnaires and direct observations. The majority of studies reviewed used multiple informants (n = 19), informants including parents (n = 18), teachers (n = 12), clinicians (n = 11) and self-report (n = 13). The most common parent-report measures were the Social Skill Rating Scale (SSRS-P; Gresham & Elliot, 1990; n = 6) and the Social Responsiveness Scale (SRS; Constantino & Gruber, 2005; n = 6). The reliability and validity of both scales has been established and both have been used in treatment studies. The SSRS was developed to screen for behaviour difficulties in typically developing children, measuring perceived frequency of behaviours linked to social competence and adaptive functioning. The SRS was designed to measures autistic traits in 4- to 18-year-olds associated with social competence. Social deficits are represented as quantitative traits rated on a 4-point Likert scale. Teachers also reported using the SSRS (n = 4) and the SRS (n = 3). The remaining studies utilised a variety of measures, the majority of which were likert-based rating scales assessing the frequency or degree to which a target behaviour is exhibited, for example positive interactions. For self-report, there was little commonality in the measures used. The majority of measures were however standardized tools, designed to assess social perception, referring to the ability to form impressions of and make inferences about other people (Magill-Evans, Koning, Cameron-Sadava & Manyk, 1995). In seven studies, participants also completed a skills knowledge assessment to measure their knowledge of specific skills targeted in the intervention.

A further seven studies included observational assessments. For example, Koning et al (2013) used the Peer Interaction Measure (PMI, Koning, Magill-Evans & Volden, 2008), an observational scoring system to record responses during a video-recorded structured, contrived social situation. Kasari et al (2012) carried out playground observations using a timed interval behaviour coding system. Both authors acknowledged a need for validation of these measures. Two studies utilised the Social Interaction Observation System (SIOS; Bauminger, 2002), to examine positive, negative and low-level unstructured peer social interactions (Kroeger, Schultz & Newsom, 2007; Lerner & Mikami, 2012). Two studies assessed skills during free-time assessment periods using blind observers (Hopkins et al., 2011; LeGoff, 2004). Owens et al. (2008) followed a similar structure although the observers were not blind to condition. Several studies have also used a socio-metric measure to indicate the prominence of a child within their classroom social network (Kasari et al., 2013; Lerner & Mikami, 2012).

In addition to social skills, some studies also measured secondary outcomes. These include self-reported feelings of loneliness and self-concept (Frankel et al., 2010), symptoms of depression (Lerner et al., 2011), emotion recognition (Beaumont & Sofronoff, 2008; Hopkins et al., 2011) and non-verbal communication skills (Lopata et al., 2008; Lopata et al., 2010; Thomeer et al., 2012). Cotugno (2009) measured change in cognition (e.g. stress/ anxiety, attention and flexibility/ transition) in addition to social skills using the YouthCare Social Competency/ Social Skill Development Scale (SCDS). Similarly, Beaumont and Sofronoff (2008) also explored coping strategies. In contrast to the studies which targeted anxiety, only one study measured overall symptomatic change (regarding child's social behaviour), using the Clinical Global Impression - Improvement Scale (CGI; Guy, 1976).

Outcomes

Parent Ratings. Eighteen studies measured parent-reported social skills. In the majority (n = 16), children in the active treatment group experienced a significant improvement in social skills post-treatment, in comparison to a control group. Effect sizes ranged from small to large. Only two studies did not report positive outcomes from parent-report measures, with no significant interaction effects indicating that the intervention group did not improve significantly more than the control group post-

intervention (Koning et al., 2013; Lerner & Mikami, 2012). Both studies used questionnaire rating scales, although parents were only blind to condition in one of the studies (Lerner & Mikami, 2012).

Child Ratings. Of those studies in which participants completed a skills knowledge assessment (n = 7), the results were largely positive with significant improvement in knowledge of social skills observed in the intervention group in comparison to the control group (Laugeson et al., 2009; Laugeson et al., 2012; Lopata., 2010; Thomeer et al., 2012). Similar findings were reported for self-perception (Castonrina & Negri, 2011; Koning et al., 2013), with participants in the intervention group (versus control group) showing significantly improved ability to infer the emotional state of others from non-verbal cues post-intervention. For self-efficacy, no significant effects were found (DeRosier et al., 2011).

Teacher Ratings. Twelve studies measured teacher-report social skills. Of these, six reported significant improvements in social behaviour post-treatment, in comparison to a control group (Beaumont & Sofronoff, 2008; Cotugno, 2009; Kasari et al., 2010; Laugeson et al., 2012; Lopata et al., 2010; Thomeer et al., 2012). Caution is however warranted when interpreting these findings due to high attrition rates in some studies. Kasari et al. (2012) found significantly greater improvements in teacher ratings of social skills following a peer-mediated intervention, in which peers from the target child's classroom were taught strategies for engaging with them, in comparison to direct social skills teaching. The remaining six studies reported no significant change for teacher-reported social skills.

Direct Observations. Positive outcomes are also reported in the studies that assessed social skills through direct observation (n = 7). In comparison to a control group, several studies report significantly greater improvements in the initiation, duration and nature of social contact following a variety of interventions. These included a play-based intervention (LeGoff, 2004; Owens et al., 2008) and a computer-based intervention (Hopkins et al., 2011). When compared with unstructured play, children who experienced direct teaching consistently showed greater improvements in social skills (Koning et al., 2013; Kroeger et al., 2007). Moreover, some studies have also found that peer popularity can also increase following a social skills intervention

(Kasari et al., 2013; Lerner & Mikami, 2012). These studies suggest that improvements generalised to a naturalistic setting.

Secondary Outcomes. Significant improvements were reported for the intervention group (versus control group) in measures of loneliness and perceived popularity (Frankel et al., 2012), anxiety management and joint attention (Cotugno, 2009) and emotional regulation skills (Beaumont & Sofronoff, 2008). Hopkins et al. (2011) measured emotion recognition and reported significant improvements for participants with higher functioning ASD who received the intervention. Similarly, Beaumont and Sofronoff (2008) found that emotion recognition improved over time, although this change was not specific to the intervention group. No significant changes were reported for non-verbal communication skills (Lopata et al., 2008; Lopata et al., 2010; Thomeer et al., 2012).

Follow-up. Six studies completed follow-up assessments. Laugeson et al. (2012) reported that at a 14-week follow up, treatment gains were maintained for the intervention group for all parent-report measures except a social cognition subscale and for self-reported social knowledge. Similarly, Beaumont and Sofronoff (2008) reported that parent-reported improvements in social skills were maintained at two follow-up points (six weeks and five months), with participants in the intervention group remaining within the range for typically developing children at five months. In contrast teacher-report improvements in overall social functioning were not maintained at six-week follow-up. Though teacher-report attrition was evident at follow-up (with only 39% completing the measure), these findings suggest school improvements diminished over time. Several other studies reported inconsistencies in treatment maintenance across measures. For example, Castorina and Negri (2011) reported maintenance of treatment gains on a self-report measure of social perception but not on a parent-report social skill measure. Similarly, Frankel et al. (2010) reported that whilst treatment gains on parent measures were maintained, gains were not maintained for either child or teacher measures.

Summary

Positive effects were reported for interventions varying in duration, frequency and content, with significant improvements in social functioning (as reported by parents, teachers, self and in observation). Findings supported the inclusion of direct teaching alongside practice opportunities and the involvement of parents and peers. Evidence for generalisation of participants' social skills in the home and school was less clear. The results of some studies suggested that this generalisation limitation may reflect an insensitivity of the assessment tools used to measure a change in targeted social skills. However, previous research has shown that children and adolescents with ASD can show difficulty in generalising learned social skills to new contexts (Bellini et al., 2007). Although this was inconsistently reported, only one of the studies implemented the intervention within a naturalistic setting (Hopkins et al., 2011). It is therefore difficult to determine the extent to which skills learnt during an intervention generalise to novel settings. Finally, the inclusion of siblings in social skills training groups did not enhance the generalisation and maintenance of treatment effects (Castorina & Negri, 2011). Peer-mediated treatments were however found to be superior to non-peer-mediated treatments in improving social functioning (Kasari et al., 2013).

Quality Assessment

Reporting. The majority of studies described the key aims and objectives, the main outcomes to be measured, the interventions (both for experimental and control groups) and the main findings. All of the studies provided detailed descriptions of participant characteristics and clearly defined the inclusion and exclusion criteria for participation. The majority of studies reported detailed information regarding attrition and the participants lost to follow-up. Only half described study hypotheses and some inconsistency in reporting of principal confounders (such as current treatment and comorbid diagnosis) was evident, predominantly where social skills interventions were examined. There was a general lack of reporting potential adverse events linked to intervention (e.g. worsening of symptoms). Only seventeen studies reported effect sizes.

External Validity. In nineteen of the studies, participants were drawn from multiple sources including ASD clinics, medical centres, schools and parent support groups. A number of studies also reported fliers being given to practitioners and

advertisement being placed in newsletters and local newspapers. Of the remaining studies, participants were recruited from community clinics or an affiliated, university based clinic. In those studies that did not report where participants were recruited from, multistage screening processes were reported in detail. Studies did not consistently report the proportion of the source population from which the participants were derived and therefore it was not possible to determine the true representativeness of the sample. No studies gave information as to whether staff and facilities used in the study were representative of those which the source population would routinely attend.

Internal Validity (bias). The studies generally reported using appropriate statistical tests and valid and reliable outcome measures. Where follow-up assessment was conducted, the majority of studies reported that a consistent time period between post-testing and follow-up had been maintained for all participants. One study reported a substantial difference in the length of time for intervention and wait-list (Fujii et al., 2013), acknowledged as a limitation of the findings. In the majority of studies (n = 24), adherence to the intervention and treatment fidelity was confirmed through various means including production of a manual, a checklist rating scale (completed by an independent rater) and recording and reviewing of sessions. In a number of studies, practitioners attended training (both classroom and applied) and these were subsequently assessed to ensure mastery of treatment manual prior to the intervention. Only half of the studies used single blind procedures (n= 15, parent or test administrator was blind to the group assignment), with the remaining studies being open trials or not reported. None of the studies reported attempting to blind participants to the intervention they received. The lack of using a double blind methodology was a common limitation in the management of bias.

Internal Validity (confounding/ selection bias). Twenty-one of the studies used randomisation procedures for both the intervention and control groups and of these, ten stratified participants by age, ability (high and low functioning), gender and language ability. In two studies the interventions were delivered in cohorts (Reaven et al., 2009; Reaven et al., 2012). Authors generally reported adjustments made for confounds present in data, with covariates used to control for differences in pre-assessment and loss of data at follow-up. An intention to treat analysis was specified in two studies to address non-completers (Reaven et al., 2012; Sung et al., 2011). In the majority of

studies participants in the different intervention groups were recruited from the same populations. It was not clear as to whether condition allocation was concealed from parents and staff until recruitment was complete and irrevocable and therefore true randomisation may have been compromised.

Power. Only five studies reported power calculations to determine sample size (Frankel et al., 2010; McNally et al., 2013; Lerner, Mikami & Levine, 2011; Storch et al., 2013; Sung et al., 2011).

Discussion

Anxiety and social skill impairments have been identified as two of the most prominent challenges experienced by young people with ASD (Ghaziuddin, 2002; Weiss & Harris, 2001). In addition to their impact on day-to-day functioning, they are both reported to have a negative impact on inclusive education success, both academically and socially (Ashburner et al., 2010; Barnard et al., 2000; Osborne & Reed, 2011). The current review summarised and analysed 31 studies to explore the efficacy of interventions that target anxiety or social skills in children and adolescents with ASD. Its aim was to provide a critical overview of the current evidence for each intervention and to consider the implications of findings for professionals who support young people diagnosed with ASD to promote inclusive education.

Summary of findings

The ten studies in the review that focused on anxiety as a primary outcome, evaluated the effectiveness of CBT-based interventions on anxiety reduction. In all studies, the interventions integrated behavioural methods that have already been shown to be effective with children with ASD in the school context (Rogers, 2000) with cognitive therapy techniques. Most studies investigated the effectiveness of manualized and published interventions, designed for, or appropriately adapted to meet the learning needs of children and adolescents with ASD. The interventions were predominantly delivered in research settings, with little school involvement. The results provide considerable evidence that anxiety reduced following intervention, with significant between group differences (for intervention compared with passive control groups) from parent-report and clinician-report following intervention. Moreover, follow-up data suggests that the positive effects of the interventions were largely maintained. Findings from self-reports in all studies were less consistent.

The 21 studies that primarily evaluated the effectiveness of social skills interventions were based predominantly on a social learning theory approach, with some incorporating elements of CBT. Only seven of the studies evaluated manualized interventions, with the majority delivering more bespoke interventions based upon the individual needs of the young people. Social skills interventions were largely shown to be effective, demonstrating the positive effects across interventions on the social skills

of children and adolescents with ASD. Of the few studies which conducted follow-up assessments, positive outcomes were most evident from parent-report, with the results for self and teacher-report less clear.

Strengths of the literature reviewed

The assessment of anxiety in young people with ASD is often described as challenging (MacNeil, Lopes, & Minnes, 2009), with reference to the difficulties in determining whether symptoms are linked to core or secondary ASD features or whether it represents a true comorbid disorder (Green & Ben-Sasson, 2010; Matson & Nebel-Schwalm, 2007). With anxiety proposed to result from ASD impairment, and also mediate or moderate ASD symptom severity (Wood & Gadow, 2010), developing an understanding of the etiology and sequelae of anxiety within this population is complex and therefore requires a multifaceted approach. Accordingly, previous reviews have highlighted a number of recommendations for improving the quality of studies used to assess co-occurring anxiety symptomology in young people with ASD. One key recommendation is that using multiple informants provides a more accurate and robust picture (Kasari, Rotheram-Fuller, Locke & Gulsrud, 2012). Similarly, when assessing social skills, it is theorised that discrete social behaviour may be context bound versus stable and generalized (Murray, Ruble, Willis & Molloy, 2009) and therefore the use of multiple informants in assessing social functioning across different contexts is also considered essential. In line with this recommendation, the majority of studies included within this review utilised multi-informants, predominantly including parents, clinicians and self-reports.

The quality of the 31 studies was generally good and the findings are likely to be relatively valid and robust. Methodological strengths across the studies included the randomisation procedures used, the use of 'gold standard' (Reaven, Hepburn & Ross, 2008) diagnostic tools for both ASD and anxiety and the inclusion of a formal measurement of treatment integrity. In the majority of studies, participants were also drawn from multiple sources and followed a clear screening process to determine eligibility. In addition, as recommended (MacNeil et al., 2009), participants were matched or stratified based on important characteristics including age, language levels, overall functioning and gender in a large proportion of the reviewed studies.

Limitations of the literature reviewed

While this review revealed some encouraging findings, there are a number of limitations which should be taken into account when interpreting the findings. These include the lack of double blinding across the studies in order to minimise reporting bias and the predominant use of wait-list control groups. The inclusion of a control group is essential for determining whether treatment effects are due to the intervention itself or other confounding factors. Although the use of a wait-list control allows a certain level of confidence in the interpretation of findings, it limits the extent to which the researcher can reliably determine whether specific ingredients or dosage (such as time spent with a therapist or compliance) of the experimental treatment mediated positive outcomes (Jensen, Weersing, Hoagwood & Goldman, 2005). Comparison with an active control group which considers differential treatment contrasts may overcome this limitation, allowing these confounding variables to be controlled for and adding to the confidence with which an intervention can be considered evidence-based.

It should be acknowledged that few studies utilised teacher-report and therefore the extent to which reported outcomes generalised to the school context is unclear. In view of findings that anxiety and social impairment can impact upon school success (Ashburner et al., 2010; Barnard et al., 2000; Osborne & Reed, 2011), there is clear value in incorporating school staffs' views into assessments. Previous reviews also emphasise the benefits of using multi-modal assessment techniques when measuring both anxiety and social skills in young people with Autism (Kasari et al., 2012; Murray et al., 2009). Within the current review, the degree to which multimodal assessment techniques were used varied significantly across the studies. In the studies that targeted anxiety, rating scales and clinical interviews were the primary techniques. MacNeil et al. (2009) argue that alongside such measures, it is essential to assess changes in behaviour that may be reflective of anxiety (for example appetite, energy level, or participation in social activities). They further advocate the use of physiological measures of stress response which include changes in heart rate, skin temperature and in hormone levels (see Romanczyk & Gillis, 2006 for a review of these measures). Whilst studies linked to social skills interventions typically used behavioural observations in addition to rating scales, the measures used were not always validated for use with young people with ASD. Moreover, whilst some studies provide a starting point in

examining the effectiveness of integrated interventions, they have not examined the statistical associations between improvements within each area, therefore it is not clear whether changes in anxiety could reliably predict changes in social skills and vice versa, as proposed in by Wood and Gadow (2010). Finally, although both anxiety and social deficits are identified as challenges within school settings for individuals with ASD (Ashburner et al., 2010; Barnard et al., 2000; Osborne & Reed, 2011), surprisingly few of the reviewed studies explored the effectiveness of interventions delivered within that context.

Conclusions and future research

Notwithstanding the limitations, the current review extends current literature by reviewing and comparing the evidence-base for interventions targeting two key areas. Overall, the findings offer considerable evidence for the effectiveness of interventions targeting anxiety and social skills for young people with ASD. The explicit inclusion and exclusion criteria used minimise the possibility of bias in the selection, interpretation and analysis of studies. The systematic approach and included quality assessment allowed an in-depth analysis of the method used to assess effectiveness and this can be used to inform future research.

The majority of interventions were implemented in clinic or research settings, with minimal school involvement. This approach to intervention, and evidence that supports its effectiveness, raises an opportunity to deliver interventions in a school context. Previous studies have evaluated school-based social skills interventions, however, single subject designs have been used, lacking the robustness of a RCT design (for a review, see Bellini et al., 2007). Future research should therefore seek to expand the evidence-base by exploring the effectiveness of school-based interventions for children and young people with ASD. These should aim to promote the maintenance and generalisation of skills taught. The small number of control-trial studies targeting anxiety within this population suggests this to be a particularly pertinent area for further study, more so in view of the detrimental impact on pupils' school success. Studies should further include an active control group to ensure confidence in findings. Moreover, they should adhere to the current recommendations which highlight the importance of multi-informant and multimodal assessments when targeting this

population. Finally, there is an evident gap in the literature for interventions which address both anxiety symptomology and social skills, despite the literature suggesting a likely association between these two areas.

In response to some of the limitations of existing research and the implications for future research, the empirical study that follows this review investigated the effectiveness of a school-based CBT intervention which targets anxiety in adolescents with ASD. As this review demonstrates, a relatively small number of studies have explored the efficacy of anxiety interventions within this population using a control trial methodology and accordingly, current findings would benefit from further replication. Moreover, research has yet to sufficiently explore the efficacy of school-based interventions using procedures which offer the quality and validity required. In view of the emphasis on inclusive education (DfES, 2001, 2004), along with increasing numbers of young people with ASD now attending mainstream schools (Waddington & Reed, 2010), the need for evidence-based interventions which are as effective when delivered within the school context is great. Therefore, the research used an RCT design, specifically within a mainstream school setting. Adhering to recommendations, it ensured the use of multi-informants, with the direct involvement of school staff in all stages of the research.

Implications for Educational Psychologists

With the current emphasis from policy makers on the importance of inclusive education for all young people, Educational Psychologists (EPs) have an increasing role in supporting schools to meet the needs of pupils with a vast range of needs and to select and deliver interventions which enable education to be accessible and achievable for all. EP practice involves not only the contribution to, but also the dissemination of, evidence-based practices to schools and the wider community. With increasing numbers of ASD pupils now enrolled within mainstream provisions, a good knowledge and understanding of the effectiveness of interventions which target specific challenges for successful integration, such as anxiety and social skills, is essential. As emphasised, further carefully designed research will be required to determine the impact of school-based interventions for pupils with ASD and EPs may be well placed to implement this.

Chapter 2

Evaluating the effectiveness of a school-based Cognitive Behavioural Therapy intervention for anxiety in children and adolescents with Autism Spectrum Disorder.

Autism Spectrum Disorder (ASD) is said to affect an estimated 1% of young people in the UK (Baird et al., 2006). In the Diagnostic and Statistical Manual of Mental Disorders (DSM 5), ASD is defined as a neurodevelopmental disorder characterised by persistent difficulties in social communication and social interaction, and restrictive, repetitive patterns of behaviour, interests or activities (American Psychiatric Association, APA, 2013). Progression in our understanding of ASD results in it now being considered a spectrum of difficulties, replacing the previously identified group of disorders which included Autistic Disorder, Asperger's Disorder and Pervasive Developmental Disorder - Not Otherwise Specific (PDD-NOS; APA, 2000). In addition to the impairments typically associated with ASD, researchers have reported a high prevalence of concurrent psychiatric conditions including anxiety disorders, with estimations ranging from 42% (Simonoff et al., 2008) to 55% (De Bruin, Ferdinand, Meester, de Nijs & Verheij, 2007), making anxiety a common feature within this population.

ASD and Anxiety

Anxiety disorders are reported to affect between 8% and 22% of all young people in the general population and are amongst the most prevalent forms of childhood psychopathology (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; McLoone, Hudson, & Rapee, 2006; Miller, 2008). Anxiety disorders differ from commonly experienced fears or worries which occur throughout development by being 'excessive' or 'persisting beyond developmentally appropriate periods' (APA, 2013). Childhood anxiety disorders are associated with substantial social and academic impairment (Ginsburg, La Greca & Silverman, 1998; Van Ameringen, Mancini & Farvolden, 2003), and may have a chronic course (for a review see Costello, Egger, & Angold, 2004).

The development of childhood anxiety is considered to reflect an interaction between genetic vulnerability (for a review see Hettema et al., 2001) and environmental

factors. Consequently, risk factors are often explored within a multifaceted framework (Degnan, Almas & Fox, 2010). Rapee (2001) proposed a comprehensive framework of the development of generalised anxiety whereby children with a genetic vulnerability to anxiety are likely to exhibit high levels of arousal, emotionality and cognitive bias. Supported by previous findings, the model suggests that anxious individuals display a tendency to overestimate danger (Butler & Matthews, 1983), increased allocation of attentional resources to the detection of threat (Mogg, Matthews, Eysenick & May, 1991) and low perceptions of control over negatives (Chorpita & Barlow, 1998). This vulnerability is linked to environmental factors, including parent/child interaction, parental anxiety levels and modelling and peer relationships, leading to the development and maintenance of anxiety.

Prevalence rates of anxiety symptoms in young people with ASD have been reported in a number of studies. White, Oswald, Ollendick and Scahill (2009) reviewed the findings of 11 such studies and reported that between 11% and 84% of young people with ASD experience some degree of anxiety. Social Anxiety Disorder is particularly prevalent in young people with ASD, with a recent study reporting 29% of children aged between 10 and 14 years to meet diagnostic criteria for this disorder (Simonoff et al., 2008). These reported prevalence rates are considerably higher than in typically developing children (Bellini, 2004; Farrugia & Hudson, 2006; Kim et al., 2000) and in children with specific learning difficulties (Gillot, Furniss & Water, 2001).

As in the typically developing population, several theoretical frameworks have been offered to explain the causal pathways linked to risk factors for anxiety in young people with ASD. Within these frameworks, similarities and differences in the aetiology of anxiety between the two groups are evident. Consistent with Rapee's proposed model (2001), it is thought that the development of co-occurring anxiety in young people with ASD can be best understood through consideration of both genetic and environmental risk factors (Wood & Gadow, 2010). Identified risk factors include the notion that young people with ASD may be behaviourally inhibited (Bellini, 2006); referring to the consistent tendency to show fear and withdrawal in novel situations (Svihra & Katzman, 2004). This characteristic has been identified as a predictor of anxiety in typically developing young people (Biederman et al., 2001). Increased amygdala volume has also

been reported to positively correlate with anxiety symptoms and is again a feature reported to be found in young people with autism (Juranek et al., 2006).

According to Frith (1998), deficits in cognitive processes may also have a role in the development of anxiety in young people with ASD. Further to the difficulties young people with ASD typically experience in conceptualising the thoughts and feelings of others (Ozonoff & Miller, 1995) and in rigid thinking (Church, Alisanski & Amanullah, 2000), recent research suggests that the same negative thinking styles commonly associated with anxiety in the general population (Schniering & Rapee, 2002) may also be evident. The role of specific behavioural markers for ASD are also considered within the literature, with reported associations between anxiety and sensory over-responsivity (Liss, Saulnier, Fein & Kinsbourne, 2006), the presence of repetitive behaviours and interests (Sukhodolsky et al., 2008) and overall severity of ASD symptomology (Kelly, Garnett, Atwood & Peterson, 2008).

Teachers report anxiety-related concerns to be among the most common presenting problems for school-attending young people with ASD (Waddington & Reed, 2006), impacting on both social functioning and academic performance (Bellini, 2004; Reaven, 2009; Sze & Wood, 2007). Researchers have shown that despite many young people with ASD demonstrating a desire for social relationships, many experience more social isolation and bullying than their typically developing peers (Bauminger & Kasari, 2000; Barnhill et al., 2002; Chamberlain et al., 2007; Church et al., 2000). Negative social experiences such as these have been reliably associated with anxiety symptomology (Green, Gilchrist, Burton & Cox, 2000; Mishna, 2003). It is suggested that the relationship between anxiety and social impairment is bi-directional, the presence of anxiety contributing to, as well as resulting from, the social difficulties experienced by many children and adolescents with ASD (Bellini, 2006; Gillot et al., 2001; White et al., 2013). Supporting this view, Sukhodolsky et al. (2008) reported a significant association between the level of anxiety and impairment in social reciprocity in children with ASD. This parallels the significant association between anxiety and social impairment found in typically developing children (Spence et al. 2000).

The impact of anxiety on typically developing children's learning is well documented in the literature, with an emphasis on its detrimental effect on executive functions (Dalgleish et al., 2003; Watts & Weems, 2006). Accordingly, teachers

frequently report that ASD pupils who display anxiety symptomology exhibit attention difficulties, significantly impacting upon their capacity to learn and perform academically (Ashburner et al., 2010). Whilst some researchers argue that these attention difficulties may be explained by attentional impairments (Keehn, Lincoln, Muller & Townsend, 2010) and poor inhibitory control (Christ, Holt, White & Green, 2007) which are evident in individuals with ASD, a possible association between anxiety and poor attention should also be considered. Attentional Control theory has been proposed by Eysenck et al (2007) to understand the effects of anxiety on cognitive functioning and task performance. This model assumes the view that when anxious, the goal-directed attentional system is impaired and does not function efficiently, increasing the extent to which processing is influenced by the stimulus-driven attentional system. The model emphasises that in addition to decreasing attentional control, anxiety increases attention to threat-related stimuli. In support of this theory, the presence of an information-processing bias in clinically anxious children has been shown in the literature, whereby they selectively attend to threat related information (for a review see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg & van IJzendoorn, 2007). Although an association between anxiety and attentional difficulties is reported, research has yet to fully explore this relationship for young people with ASD. With a vast array of research demonstrating a link between attention-related behaviours and academic performance (Fleming et al., 2004; Merrell & Tymms, 2001) and recent research indicating that 55% of young people with ASD demonstrate attention problems (Lecavalier, 2006), it is an area worthy of further consideration.

Cognitive Behavioural Therapy for children and adolescents with ASD

Given that significant levels of anxiety are prevalent among young people with ASD, treatment approaches for this population have received increased empirical attention. One treatment option that is growing in use for young people with ASD is cognitive-behavioural therapy (CBT), developed by Beck, Rush, Shaw and Emery (1979). The efficacy of CBT for childhood anxiety in typically developing children has been well supported in the literature (for a review of the evidence see Cartwright-Hatton, Roberts, Chitsabesan, Fothergill, & Harrington, 2004). A fundamental principle of CBT is that it is important to address not only the behavioural manifestations of problems, but also the underlying cognitions that lead to those behaviours (Rotheram-

Fuller & MacMullen, 2011). Through CBT, the individual learns skills to modify their thoughts and beliefs, challenging dysfunctional beliefs and replacing with more adaptive thoughts (Beck, 1993). Anxious young people are reported to experience significantly more negative cognitions than their non-anxious peers (Bogels & Zigterman, 2000; Kendall & Chansky, 1991) and accordingly, CBT continues to be a primary treatment recommendation (National Institute for Health and Clinical Excellence, NICE, 2013). The occurrence of dysfunctional thinking patterns in young people with ASD has also been explored and in a recent study, anxious adolescents with ASD scored significantly higher on negative automatic thoughts in comparison to non-anxious adolescents and adolescents with diagnosed anxiety disorders (Farrugia & Hudson, 2006). In view of such findings, attention is being directed towards the efficacy of CBT in the management of anxiety in young people with ASD. Lang, Register, Lauderdale, Ashbaugh and Haring (2010) reviewed nine studies involving the treatment of anxiety in individuals with ASD using CBT and reported that within each study, at least one dependent variable suggested a reduction of anxiety following implementation of CBT. The review concluded CBT to be a versatile and effective intervention approach for this population.

Moreover, with research suggesting links between anxiety and the attention difficulties, social worry and social impairments experienced by many young people with autism (Ashburner et al., 2010; Farrugia & Hudson, 2006; Sukhodolsky et al., 2008), researchers have started to explore whether changes in anxiety can mediate change within these secondary areas. In two recent studies, which explored the effectiveness of CBT interventions specifically targeting anxiety in young people with ASD, Chalfont et al. (2007) and Sofronoff et al. (2005), reported that significant reductions in anxiety were associated with significant reductions in social worry and negative internalising thoughts. Likewise, Storch et al. (2009) reported reductions in anxiety following CBT to be associated with improved social functioning as reported by parents of children with ASD. With regards to attention difficulties, although research targeting anxiety in the ASD population has yet to fully explore these associations, research with typically developing young people has consistently shown that attentional bias to threat cues in children and adolescents with anxiety disorders reduce following successful cognitive–behavioral therapy (Waters, Wharton, Zimmer-Gembeck & Craske, 2008).

Whilst findings have been encouraging, CBT interventions for young people with ASD have not been well explored in the school setting, with research predominantly conducted in clinic-based settings. Given that children and adolescents with ASD can show difficulty in generalising learned skills to new contexts (Bellini et al., 2007; White et al., 2007), it seems critical to consider schools as a primary context in which to deliver CBT interventions. This is particularly salient for young people who experience school-based anxiety. The use of school-based CBT for anxiety in typically developing children is well supported (for a review see Neil & Christensen, 2009) and based on these findings, researchers have suggested methods for adapting these interventions for use with pupils with ASD (Rotheram-Fuller & MacMullen, 2011).

The Current Situation

Over the past decade there has been a growing drive towards inclusive education (DfEE 1997; DfE 2001, 2004) and therefore, the promotion of all pupils' presence, participation, acceptance and achievement in mainstream schools (Humphrey, 2008). Recent UK government statistics suggest that 53% of children and adolescents with statements of Special Educational Needs are now educated within mainstream schools (DfE, 2013). In relation to pupils with ASD, a recent survey reported by Waddington and Reed (2010) suggests that 60% of pupils with ASD attend mainstream schools. Children and adolescents with ASD can face considerable challenge in the mainstream environment given their difficulties in social-communication, emotional regulation and adaptability to a dynamic school environment (Koegel, Singh & Koegel, 2010). Recent qualitative investigations show that pupils with ASD can find inclusive education to be anxiety-provoking, particularly at secondary level (Browning, Osborne & Reed, 2009; Connor, 2000; Humphrey & Lewis, 2008), impacting upon academic success (Ashburner et al., 2010) and intensifying the social and functioning difficulties experienced by children and adolescents with ASD (see Myles et al., 2001). Given the systemic move for inclusion of children and adolescents with ASD into mainstream schools, this population are perhaps more in need of evidence-based anxiety treatments to ensure their success through education than ever before.

Aim of this research

The aim of the current study was to use a randomised control trial (RCT) design to test the effectiveness of a school-based CBT intervention on changes in anxiety in adolescents with ASD. In addition, the study explored whether the intervention would mediate change in social worry, social responsiveness, attentional control and attention to threat. In view of the recent legislation promoting the inclusion of all pupils with SEN, a key objective of this study was to inform the development of future school-based interventions to support the inclusion of pupils with ASD into mainstream schools. In accordance with an RCT design, participants were randomly allocated into intervention or wait-list control groups. Consistent with previous research, it was anticipated that pupils in the intervention group would experience a significantly greater reduction in anxiety in comparison to a wait-list control group. Using multiple informants is said to provide a more accurate and robust picture when examining anxiety within the ASD population (Kasari, Rotheram-Fuller, Locke & Gulsrud, 2012) and therefore, parent, teacher and self-reports of anxiety were utilised in this study. It was also hoped that the use of multiple informants would provide insight into whether skills taught within a school environment could be generalised to other contexts such as home. Secondly, it was hypothesised that where there was a significant reduction in anxiety symptoms, pupils' social responsiveness would increase. Thirdly, it was hypothesised that where there was a significant reduction in anxiety symptomology, pupils' ability to attend would improve in the domains of attentional control and attention to threat. Finally, it was hypothesised that where there was a significant reduction in anxiety symptomology, social worry would decrease.

Method

Design

An RCT design was employed to evaluate the effectiveness of the 'Exploring Feelings' CBT intervention (Attwood, 2004) in reducing anxiety symptoms in a sample of mainstream secondary school pupils with ASD. There was a between-subjects variable of group (intervention and wait-list control) and a within-subjects variable of time (pre and post-intervention and six-week follow-up). The primary outcome measurement was anxiety. In addition, secondary outcomes associated with anxiety symptoms were considered including social outcomes (social worry and social responsiveness) and attention (attention to threat and attentional control). Sample size was determined using a G* power analysis assuming a large effect size for group differences at post-intervention. With an expected sample of 30 children, and assuming a treatment effect size of 1.23 for parent-report anxiety measures (see Wood et al. 2009), the power required to detect a significant effect for time was .9 ($p < .05$).

Participants

The participants were 35 pupils recruited from four mainstream secondary schools located within the south-east of England (Figure 4). The sample consisted of 31 boys and 4 girls *(Mean age* = 13.2, *SD* = 1.1, *range* = 11.1 - 15.8). There were three criteria for inclusion in this study. Firstly, participants were required to have a formal diagnosis of an ASD from a qualified health professional. Following parental consent, existing psychological and paediatric reports were accessed to provide confirmation of this. To account for variance in the recency of diagnosis (ranging from 6 months to 13 years), the Social Communication Questionnaire (SCQ; Rutter, Bailey & Lord, 2003) was used to confirm that pupils met the criteria for ASD. Secondly, the use of self-report measures and the nature of the prescribed intervention necessitated the exclusion of individuals with significant cognitive impairment. Participants were therefore required to have a verbal and total IQ score of $\geq$70. Thirdly, participants were required to be experiencing clinically significant symptoms of anxiety as measured by elevated scores on either teacher or parent measures. On the School Anxiety Scale - Teacher-Report (SAS-TR), a score of 17 or above is considered to represent clinically high anxiety (Hajiamini et al., 2012). On the parent-report version of the Spence Children's Anxiety

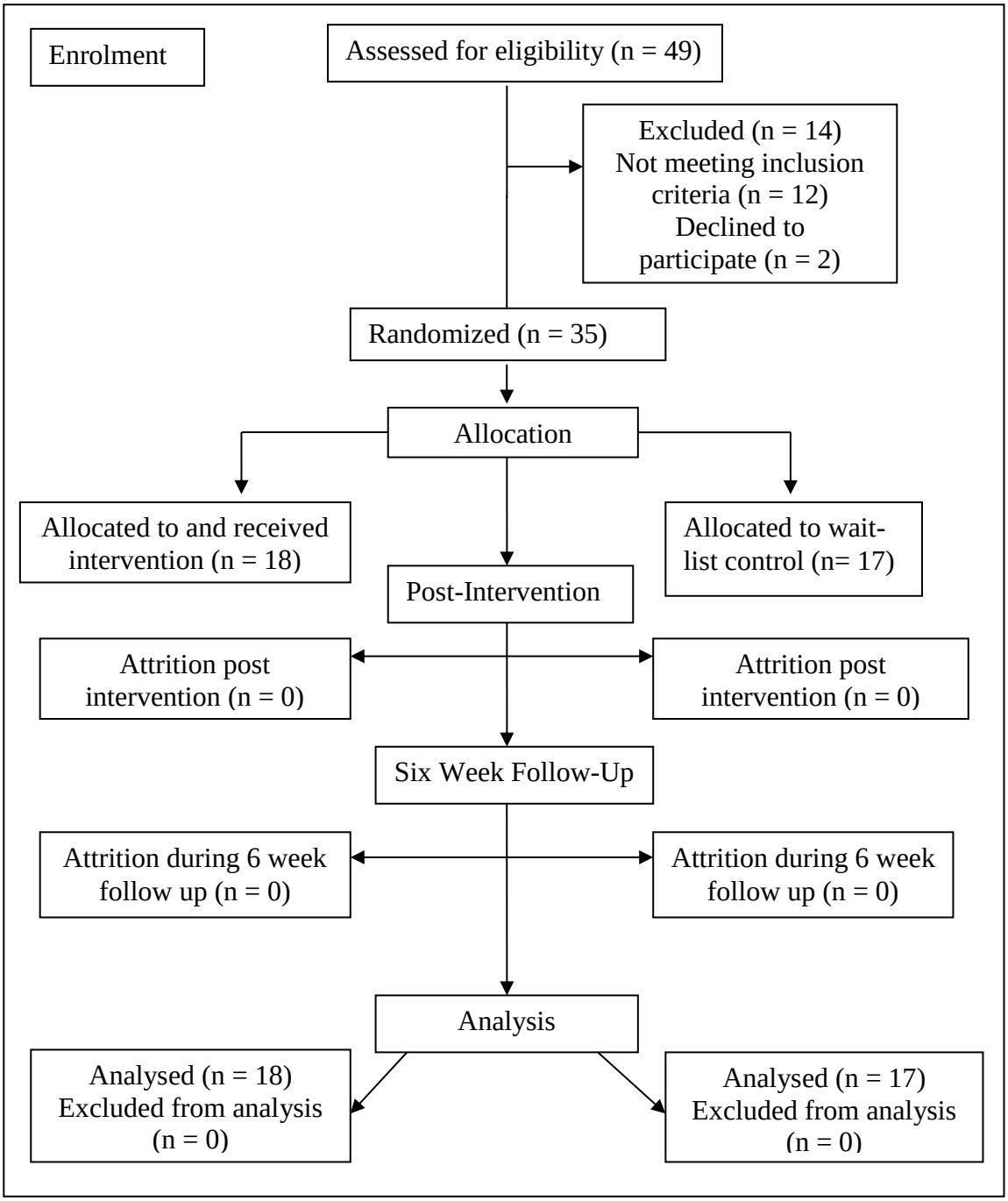

Figure 4. Flow of participants through each stage of the study

Scale (SCAS-P), a score of 24 or above has been suggested as an indicator of clinical caseness, being one standard deviation above the mean in a community sample (Nauta et al., 2004). These scores were then used as baseline measures of anxiety. Pupils who were identified as being in active treatment or currently receiving medication for

anxiety (n = 3) were excluded from the study. To remain within the study, pupils were required to attend a minimum of 5 of the 6 intervention sessions.

Measures

Social Communication Questionnaire (SCQ; Rutter, Bailey & Lord, 2003). The SCQ is a 40 item parent-report questionnaire used to assess and screen for characteristics of ASD. The SCQ is designed for use with participants aged 4-40 years and each item requires a yes-no response. Total scores can range from 0-40. To assess present symptomology, the "Current" version of the measure was used in this study, which focuses on the most recent 3-month period. The SCQ has established validity with the Autism Diagnostic Interview-Revised (ADI-R; Rutter, Le Couteur & Lord, 2003) and has been shown to discriminate reliably between children with and without ASD at the established cut-off point of ≥15 (Berument et al., 1999), with a sensitivity of 0.88 and a specificity of 0.72 (Chandler et al., 2007).

Weschler Abbreviated Scale of Intelligence - second edition (WASI-II; Weschler, 1999). This test was used to measure the cognitive and verbal ability of the participants. The measure is designed for individuals aged 6 to 89 years and consists of four subtests: matrix reasoning (30 items), block design (13 items), vocabulary (31 items) and similarities (24 items). The scores from the subtests are totalled to create a score for performance intelligence (matrix reasoning and block design), verbal intelligence (vocabulary and similarities) and full scale intelligence (all four subtest scores). The use of the WASI is supported by internal reliability of 0.98 and test-re-test reliability of 0.92 (Garland, 2005).

Anxiety measures

School Anxiety Scale—Teacher Report (SAS-TR; Appendix D). The SAS-TR (Lyneham, Street, Abbott & Rapee, 2008) is a 16-item teacher-report measure of anxiety, designed to assess the behaviour of children at school, targeting the behaviours and feelings distinctive to the experience of anxiety. Items are answered on a four-point scale. Although primarily designed to target a population aged between 5 and 12 years, it was felt that as the measure was designed based on the Spence Child Anxiety Scale, it was suitable to the targeted population within this study. The measure provides a total

score for anxiety (scores ranging from 0 - 48) and two subscale scores for social anxiety (9 items, scores ranging from 0 - 27) and generalised anxiety (7 items, scores ranging from 0 - 21). The authors reported a cronbach's α coefficient for the total anxiety score to be .93, indicating a high degree of homogeneity among items. In the current study alphas for total anxiety and the two subscales and at each time point were >.7.

Spence Children's Anxiety Scale (SCAS; Spence, 1998; Appendix E). The SCAS is a self-report measure of child anxiety, consisting of 38 items assessing anxiety symptoms which correspond to DSM-IV (American Psychiatric Association, 1994) anxiety disorder subtypes. It also has six positive, filler items to reduce negative response bias. This measure was developed for children aged 7 to 16 years. For each item, children are asked to rate themselves based on the descriptions given on a four-point Likert scale. The measure generates a total score for anxiety between 0 and 114, where higher scores indicate higher anxiety. It also provides a score for six separate subscales. The SCAS has high internal consistency and satisfactory test-retest reliability, with a Cronbach alpha coefficient of .93 (Spence, 1998). In the current study alphas for total anxiety and the two subscales and at each time point were >.7.

Spence Child Anxiety Scale for Parents (SCAS-P; Spence, 1998; Appendix F). The SCAS-P is a 38 item parent-report measure of child anxiety, formulated as closely as possible to the corresponding items of the child version of the SCAS. This measure was developed for children aged 7 to 17 years. For each item, parents are asked to rate their child based on the descriptions given on a four-point Likert scale. The measure generates a total score for anxiety between 0 and 114, where higher scores indicate higher anxiety. Like the child self-report, it evaluates symptoms according to six subscales. The SCAS – P has good internal consistency, with a Cronbach alpha coefficient reported of .89 (Nauta et al., 2004) and acceptable reliability and validity for use with children with ASD (Rodgers et al., 2012). In the current study alphas for total anxiety and the two subscales and at each time point were >.7.

Social Worries Questionnaire - Pupil version (SWQ - P; Spence, 1995; Appendix G). The SWQ was developed to assess social anxiety. It contains 13 items relating to worries about and avoidance of social-evaluative situations in various settings. Items are rated in terms of worry experienced in each situation. The measure

generates a total score for social worry between 0-26, with high scores indicating greater worry. The measure is reported to have high internal consistency with a coefficient alpha of 0.82 (Russell & Sofronoff, 2005). In the current study alphas for total score at each time point were >.7.

Social Worries Questionnaire - Teacher version (SWQ - T; Spence, 1995; Appendix H). The Teacher version of the SWQ involves 8 items relating to social-evaluative fears at school. The measure generates a total score for social worry between 0-16, with high scores indicating greater worry. The internal consistency of the scale is reported to be extremely high with reliability of 0.93 and a coefficient alpha of 0.96 (Spence, 1995). In the current study alphas for total score at each time point were >.7.

Secondary outcome measures

Social Responsiveness Scale (SRS, Constantino & Gruber, 2002). The SRS is a 65 item rating scale measuring a child's social impairments. Items are scored from 1 (not true) to 4 (almost always true), generating a total score of 0 - 260. Higher scores on the SRS Total score reflect greater severity of social disability. It is appropriate for use with children from 4 to 18 years and may be completed by both parents and teachers. Internal consistency is excellent (0.97, Constantino & Gruber, 2002) and Constantino et al. (2003) report a three-month test-retest reliability of .88 in clinical subjects. Although the measure has primarily been used as a tool to identify characteristics of ASD rather than as an outcome measure, there is emerging evidence that it is sensitive to change with treatment for people with ASD (Lopata et al., 2010; White et al., 2013).

Attentional control. In the current study, a variation of the Erikson Flanker Task (Erikson & Schultz, 1979) was used to measure attentional control. This is a short response inhibition test, used to assess the participant's ability to shift from a situation where there is no conflict to one where conflict resolution is required, and by responding to subdominant stimuli over competing, dominant stimuli (Rueda, Posner, Rothbart & Davis-Stober, 2004). The task on each trial was to classify the central arrow as either pointing left or right. Participants were presented with rows of five symbols on a computer screen and instructed to identify the direction of the central arrow, by pressing corresponding left or right arrow buttons on the response box as quickly and accurately as possible. The flanking arrows presented in a congruent configuration

(<<<<< or >>>>>), an incongruent configuration (<<><< or >><>>) or a neutral formation (= = > = = or = = < = =). The flanker display appeared immediately after a fixation cross, and remained on screen until either the participant made a response or 1500 milliseconds passed. All participants completed 12 practice trials before performing 3 blocks of test trials, each consisting of 48 individual trials. The congruent, incongruent and neutral trials were presented in a random order. The overall task took around ten minutes for each child. No feedback was provided for correct or incorrect answers. On each trial, accuracy and response time was recorded. Preliminary analyses looked at reaction times (RTs) for each trial type; however, the focus of the analysis for this task was a conflict score, calculated by subtracting the mean RT of the congruent items from the mean RT of the incongruent items. Higher conflict scores are indicative of greater interference (i.e., less ability to filter out distracting stimuli). Rueda et al (2004) examined test-retest reliability of the flanker task in children and using split half reliability, reported RT (.94) and error rate (.93) to be highly correlated.

Schematic emotional face test. In order to explore attention to threat, an emotional stroop colour matching schematic face task was used. Angry, happy, fear and neutral face stimuli made up the schematic faces, with each face being made up of a pair of eyes, eyebrows and a mouth. Facial features and the face outline was red, blue, green or yellow. The presentation screen was black. Participants saw 24 trials for each emotion; 12 emotion face and 12 introverted face control trials, making a total of 72 randomly presented trials. Face and introverted face stimuli were presented individually and in the same position on the screen, remaining on screen until either the participant made a response or 1500 milliseconds passed. The stimuli were presented on a laptop computer and the responses were made using a response box coloured red, blue, green and yellow from left to right. Participants were asked to match the outline colour of a picture on the screen to the coloured buttons as quickly and accurately as possible. On each trial, accuracy and response time was recorded. Preliminary analyses looked at reaction times (RTs) for each trial type; however, the focus of the analysis for this task was an attentional bias score. For both the emotion and the control faces, attentional bias scores were calculated by subtracting individual mean RT values for neutral faces from those for angry, happy and fear faces. This created angry-neutral, happy-neutral

bias and fear-neutral scores for emotion faces and for control faces; positive scores indicated interference to colour matching, negative scores indicated facilitation.

Intervention

The 'Exploring Feelings' CBT intervention created by Attwood (2004) was used with the intervention group. The manualised six-week programme is designed for use with pupils with ASD, using developmentally appropriate language and materials. Each of the six sessions lasted for 90 minutes and were led by the researcher, with a member of school staff present. At the end of each session, a home project was explained to participants and discussed at the start of the next session. Worksheets for the sessions were taken home on completion of the intervention. The CBT programme was designed to be highly structured and informative and the participants worked to create a metaphoric 'tool box' of anxiety management strategies across the sessions (see Table 1). Sofronoff, Attwood and Hinton (2005) evaluated the effectiveness of the intervention with a sample of children with ASD and reported significant decreases in parent-reported anxiety symptoms in comparison to a wait-list control group.

Procedure

Ethical approval was sought from the University of Southampton, School of Psychology Ethics Committee, followed by approval from the Research Governance office (Appendix I). In the first stage of recruitment, the researcher approached each of the secondary schools located within the authority and provided information regarding the study (Appendix J). For those schools that indicated interest in participating, the Inclusion Manager was approached by the researcher and asked to identify pupils with an ASD diagnosis. Informed parental consent was obtained for all pupils (see Appendix K). Following consent and confirmation of diagnosis, parents were asked to complete the SCQ, the SCAS-P and the SRS. At this point Teachers were also asked to complete the SAS-TR, SWQ and the SRS. The researcher then met individually with pupils to administer the WASI, the flanker test, the schematic face test, the SWQ and the SCAS. Parents of those who did not meet the inclusion criteria were informed directly by the researcher. Informed assent was received from all participants (see Appendix L) prior to completing the pre-measures. Following completion of the pre-intervention measures,

Table 1.

Summary of intervention content (sessions 1 - 6; Reproduced from 'Exploring Feelings: Anxiety' Attwood, 2004).

Session	Key Objectives
Session 1	Explored two positive emotions - happiness and relaxation, with a range of individual and group activities to measure and compare emotions in specific situations. Participants were taught two specific relaxation strategies - controlled breathing and progressive muscle relaxation.
Session 2	Explored anxiety, considering the changes which occur in thinking, physiology and behaviour. The concept of the 'tool box' for managing anxiety was introduced, with a focus on 'physical tools' that provide a constructive release of emotional energy and 'relaxation tools' that reduce physiological symptoms of anxiety.
Session 3	Explored 'social tools', a category of activities which relate to how others can support restoration of positive feelings and 'thinking tools', a category of activities or thoughts which test the evidence for feared outcomes.
Session 4	Introduced the 'thermometer', a tool enabling the measurement of degrees of emotion. Group discussion then explored how each member of the group could share strategies or tools to successfully manage their anxiety.
Session 5	Explored how social stories (Gray, 1998) can be used to manage anxiety and the concept of creating an 'antidote' to poisonous or negative thoughts.
Session 6	Allowed participants to work together to design an individualised programme for each to improve their management of anxiety based upon the tools explored.

participants within each school were randomly assigned through a computer-generated assignment system to either the intervention group or the wait-list control group. Groups contained between four and six participants (as recommended by Sofronoff, Attwood &Hinton, 2005). Participants assigned to the wait-list control group were to be given the opportunity to receive the intervention as delivered by schools after study completion. Following the six week intervention period, all participants completed the post-measures. Six weeks following this, the final follow-up measures were completed and participants were debriefed. A return period of two weeks was given for measures at each time point. At post-intervention a 100% return rate was achieved. At follow-up, 72% of parent measures were returned and 100 % of teacher measures. Administration of measures individually for participants in school took between 40 and 60 minutes at each time point and the order of experimental tasks was randomised.

Results

Approach to Analysis

To explore the impact of the 'Exploring Feelings' CBT intervention on the primary outcome (anxiety) and secondary outcome measures (social worry, social responsiveness, attentional control and attention to threat), group differences were explored over three time points using a repeated measures ANOVA, with group (Intervention and Wait-list control) and time (T1, T2 and T3) as factors. Raw scores from questionnaire data were analysed for anxiety and social responsiveness, conflict scores were computed and analysed for attentional control and bias scores were computed and analysed for attention to threat. In addition to considering statistical significance, Effect Sizes, as measured by Partial Eta Squared, were computed. Effect sizes have value in emphasising the size of the difference between two variables, without confounding this with sample size (Cumming, 2013). An effect size of >.1 is considered to be small, >.25 is considered to be medium and >.4 is considered to be large (Portney & Watkins, 2000). As well as exploring statistically significant change scores at the group level, the variability of response to treatment within the sample was also explored. To capture meaningful individual change, the reliable change index (RCI), proposed by Jacobson and Truax (1991), was calculated for the primary outcome measures. In addition, the primary outcome measures were analysed using Clinically Significant Change (CSC; Jacobson & Truax, 1991).

Descriptive Statistics

There was no attrition for pupil and teacher responses between the three time points. Parent-responses were obtained for all participants at T1 and T2. At T3, responses were not received from 3 parents of participants in the intervention group and 7 in the control group. Parametric assumptions were tested using the Kolmogorov-Smirnov test of normality and the Levene's test of homogeneity of variance for pre (T1), post (T2) and follow-up (T3) data for each dependent variable and group and all were found to be within acceptable limits. Pre-intervention group differences were assessed using t-tests and no significant differences were found for age, IQ, gender or diagnosis (Table 2). Means, standard deviations and range of scores for the primary and secondary variables at T1, T2 and T3 are displayed in Table 3. There were no significant group

Table 2.

Demographics for participants in the intervention (IT) and waitlist (WL) conditions.

	IT (n = 18)	**WL (n = 17)**	***t***	***p***
Child sex (male)	16 (88.9%)	15 (88.2%)	-.06	.91
Child Age	13.41 (S.D. 1.06)	13.01 (S.D. 1.13)	1.08	.82
Autism Spectrum Disorder				
ASD	16 (88.9%)	10 (58.8%)		
Asperger's Syndrome	2 (11.1%)	7 (41.2%)		
Full Scale IQ	105.44 (S.D.17.83)76-157	102.00 (S.D.11.30) 82-124	.68	.44
Verbal IQ	102.22 (S.D. 16.37)72-129	107.00 (S.D.14.72) 88-142	-.91	.69
SCQ Score	18.61 (S.D. 4.33) 15 - 28	19.06 (S.D.4.94) 15-30	-.29	.62

Note: SCQ: Social Communication Questionnaire.

differences between any scores on self-report anxiety, social worries, social responsiveness, attentional control and attention to threat with all *ts*< 1.5 and all *ps*>.1. There was a significant difference for parent-report anxiety, $t(33) = 2.47$, $p = .01$ and teacher-report anxiety, $t(33) = 2.88$, $p < .01$, with higher baseline scores for the intervention group (see Table 3).

Correlations between all primary and secondary T1 measures were calculated (see Table 4). Parent-report and self-report anxiety were significantly correlated, suggesting that both are targeting the same construct. Teacher-report anxiety did not significantly correlate with either of these variables. Significant positive correlations were found between self-report anxiety and social worries and between teacher-report anxiety and social worry. Parent and teacher-report anxiety also significantly correlated with social responsiveness, indicating that increased anxiety is associated with greater social worry and increased social impairment. The flanker conflict score did not correlate with any of the primary outcomes. There was a significant negative correlation between full IQ score and the flanker conflict score, indicating that increased IQ is associated with greater attentional control (less interference). For the threat appraisal task, angry and fear bias scores positively correlated with each other. Parent-report anxiety correlated with the angry bias scores, indicating that as anxiety increases, response times for angry versus neutral faces increases, suggesting greater interference.

Table 3.

Means, Standard Deviations and Range of Scores for the total and subscale scores for Anxiety, Social Responsiveness, Attentional Control and Attention to threat at T1 (pre-intervention), T2 (post-intervention) and T3 (follow-up) for the Intervention and Wait-List control groups.

	Intervention (n = 18)			**Wait-List Control (n = 17)**		
Variable	T1	T2	T3	T1	T2	T3
	Mean (SD) [Range]	Mean (SD) [Range]	Mean (SD) [Range]	Mean (SD) [Range]	Mean (SD) [Range]	Mean (SD) [Range]
Anxiety						
Parent	(n = 18)	(n = 18)	(n = 15)	(n = 17)	(n = 17)	(n = 11)
Total	47.61(16.25)[16-78]	31.89(14.86)[10-62]	26.67(10.68)[13-51]	35.5(10.82)[15-50]	40.94(16.03)[18-74]	40.82(19.05)[3-73]
GAD	8.06(3.5)[2-14]	6.00(3.07)[2-11]	4.47(1.96)[2-9]	6.12(2.26)[2-10]	7.24(3.17)[3-15]	6.73(3.23)[1-12]
SP	10.11(3.92)[4-18]	6.83(3.55)[0-15]	4.47(1.96)[2-9]	8.29(3.37)[3-13]	9.18(3.56)[1-16]	7.55(4.39)[1-16]
Self	(n = 18)	(n = 18)	(n = 18)	(n = 17)	(n = 17)	(n = 17)
Total	40.50(16.87)[15-87]	27.50(14.70)[10-57]	26.82(15.50)[4-49]	35.12(15.32)[10-77]	35.41(21.35)[15-100]	30.35(14.62)[5-66]
GAD	8.89(3.29)[4-17]	6.00(2.61)[3-12]	5.35(2.64)[1-10]	6.94(3.11)[3-14]	6.53(3.17)[2-15]	6.06(3.77)[1-13)
SP	7.28(3.08)[0-12]	4.78(2.56)[1-9]	4.47(3.22)[0-10]	6.71(3.39)[1-13]	6.94(4.35)[2-15]	6.00(4.26)[1-16]
Teacher	(n = 18)	(n = 18)	(n = 18)	(n = 17)	(n = 17)	(n = 17)
Total	28.61(7.81)[9-39]	18.94(8.93)[3-38]	14.39(7.74)[2-34]	20.29(9.23)[7-48]	20.82(9.81)[10-48]	19.94(11.23)[5-48]
GA	16.89(4.34)[7-23]	10.39(5.33)[0-19]	8.72(5.07)[0-18]	12.24(4.42)[7-27]	12.29(4.85)[6-27]	11.35(5.62)[5-27]
SA	11.72(4.51)[2-20]	8.11(5.68)[0-19]	8.72(5.07)[0-18]	7.94(5.72)[0-12]	8.53(5.46)[2-21]	8.59(6.11)[0-21]

SW	(n = 18)	(n = 18)	(n - 15)	(n = 17)	(n = 17)	(n = 17)
Parent	12.33(4.74)[4-22]	8.83(4.42)[3-16]	7.35(4.82)[0-15]	12.41(5.75)[4-26]	12.29(6.62)[4-24]	9.76(6.80)[1-24]
SW	(n = 18)	(n = 18)	(n - 18)	(n = 17)	(n = 17)	(n = 17)
Teacher	11.28(3.611)[5-16]	8.00(4.42)[0-16]	6.39(3.13)[0-14]	9.18(4.28)[0-15]	8.41(4.45)[1-15]	8.41(5.01)[0-16]
SI						
Parent	(n = 18)	(n = 18)	(n = 15)	(n = 17)	(n = 17)	(n = 11)
Total	111.83(25.24)[37-152]	98.56(23.67)[53-138]	96.47(21.69)[66-132]	114.06(23.72)[69-151]	109.41(24.68)[69-150]	103.08(13.81)[84-126]
Teacher	(n = 18)	(n = 18)	(n = 18)	(n = 17)	(n = 17)	(n = 17)
Total	96.56(31.44)[35-152]	87.94(29.12)[27-159]	83.11(35.40)[18-163]	89.24(37.79)[27-159]	92.88(37.80)[29-159]	92.29(35.00)[14-159]
AC	(n = 18)	(n = 18)	(n = 18)	(n = 17)	(n = 17)	(n = 17)
Conflict	194.81(108.81)[420]	67.06(38.62)[122]	48.10(45.79)[169].	206.06(137.08)[524]	151.18(149.86)[451]	134.56(93.76)[292]
AT	(n = 18)	(n = 18)	(n = 18)	(n = 17)	(n = 17)	(n = 17)
Happy	-27.58(99.84)[363]	-.29(66.08)[295]	-19.26(54.62)[225]	8.35(121.01)[526]	-7.06(77.53)[295]	-2.70(100.98)[466]
Fear	-2.55(155.40)[679]	21.21(87.47)[352]	-9.64(56.08)[210]	30.46(97.64)[437]	-11.19(79.76)[296]	19.25(80.82)[287]
Angry	97.25(127.88)[419]	13.25(62.65)[236]	-9.24(42.47)[141]	64.01(69.18)[320]	23.06(105.90)[493]	44.82(163.19)[581]

Note. SW = Social Worry. SI = Social Impairment. AC = Attentional Control. AT = Attention to threat. Parent-report anxiety measured by the Spence Children's Anxiety Scale - Parent (SCAS-P), Self-report anxiety measured by Spence Children's Anxiety Scale (SCAS), Teacher-report anxiety measured by School Anxiety Scale - Teacher Report (SAS-TR), Social Worries measured by Social Worries Questionnaire - Pupil (SWQ-P) and Social Worries Questionnaire - Teacher (SWQ-T). Social Impairment measured by Social Responsiveness Scale Parent (SRSP) and Teacher (SRST), Attentional control measured Flanker Task, Attention to Threat measured by Schematic face task.

Table 4

Summary of correlations at T1 between parent, pupil and teacher-report anxiety, parent and teacher-report social responsiveness, attentional control and threat appraisal

Variables		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Anxiety	1. Parent	1	.486**	.244	.324	.110	.386*	.143	-.215	-.137	.439**	-.185	.267
	2 Self		1	.141	.480**	.114	.300	.248	.197	-.085	.262	-.080	-.257
	3 Teacher			1	.167	.728**	-.067	.449**	-.126	-.129	-.079	-.202	-.118
Social Worry	4 Self				1	.115	.253	.241	-.058	.037	.177	.209	.080
	5 Teacher					1	.193	.390*	-.078	-.179	-.096	-.086	-.133
Social Impairment	6 SRS-P						1	.120	-.282	-.078	.324	.007	.366*
	7 SRS-T							1	-.201	.029	-.208	-.167	.035
Attention Control	8 Conflict Score								1	-.152	.116	.051	-.400*
Attention to threat	9 Happy Bias									1	.136	.686**	.117
	10 Angry Bias										1	.248	.378*
	11 Fear Bias											1	.127
	12 IQ												1

Note. Parent-report anxiety measured by the Spence Children's Anxiety Scale - Parent (SCAS-P), Self-report anxiety measured by Spence Children's Anxiety Scale (SCAS), Teacher-report anxiety measured by School Anxiety Scale - Teacher Report (SAS-TR), Social Worries measured by Social Worries Questionnaire - Pupil (SWQ-P) Teacher (SWQ-T). Social Impairment measured by Social Responsiveness Scale Parent (SRSP) and Teacher (SRST), Attentional control measured Flanker Task, Attention to Threat measured by Schematic face task., IQ - Full scale IQ score as measured by Weschler Abbreviated Scale of Intelligence.

#p < .1, **p* < .05, ***p* < *.001*

Flanker Task Integrity. In order to check the validity of the Flanker task, time 1 response times for each trial type (congruent, neutral and incongruent) were explored using a repeated measures ANOVA. This analysis showed that there was a significant effect of condition $F(1.36, 46.12) = 74.23$, $p = <.01$, with overall response times being significantly different. Post hoc analyses using pairwise comparisons (using Bonferroni adjustment) showed that increased RTs to respond to conflict trials were significantly slower (mean RT =951.53ms), compared with both congruent (mean RT = 751.26ms) and neutral trials (mean RT = 751.44; see Figure 5). A second repeated measures ANOVA was conducted to explore the error rate for each trial type. This analysis showed that there was a significant effect of condition, $F(68, 1.65) = 34.62$, $p = <.01$. Post hoc analyses using pairwise comparisons (using Bonferroni adjustment) showed significantly more errors for the conflict trials (Mean number of errors = 3.2), compared with both congruent (Mean number of errors = 1) and neutral trials (Mean number of errors = .86).

Schematic Stroop Task Integrity. In order to understand baseline task performance in the schematic stroop task, time 1 response times for each Face Upright (angry, happy, fear, neutral) and Inverted Control Face (angry, happy, fear, neutral) were explored using a repeated measures ANOVA. This analysis showed that there was a significant effect of condition, $F(7, 231) = 2.57$, $p = 0.14$. Post hoc analyses using pairwise comparisons (using Bonferroni adjustment) showed that increased RTs to respond to Upright Face angry trials were significantly slower (mean RT = 955.60ms), compared with fear (mean RT = 916.62ms), happy (mean RT = 893.047ms) and neutral trials (mean RT = 902.66ms; see Figure 5). For the Inverted Control Face, there were no significant differences between RTs for the angry (mean RT = 902.63ms), fear (mean RT = 923.34ms), happy (mean RT = 903.02ms) and neutral (mean RT = 887.73ms) trials. The number of errors within each trial type did not significantly differ.

Primary Outcomes

Parent-Report Anxiety. Due to attrition at follow-up (3 non-responders in the intervention group, 7 non-responders in the control group), a repeated measures ANOVA for group (intervention, $N = 18$, control, $N = 17$) by time (T1 and T2) was initially conducted. Analyses showed that there was a significant main effect of time

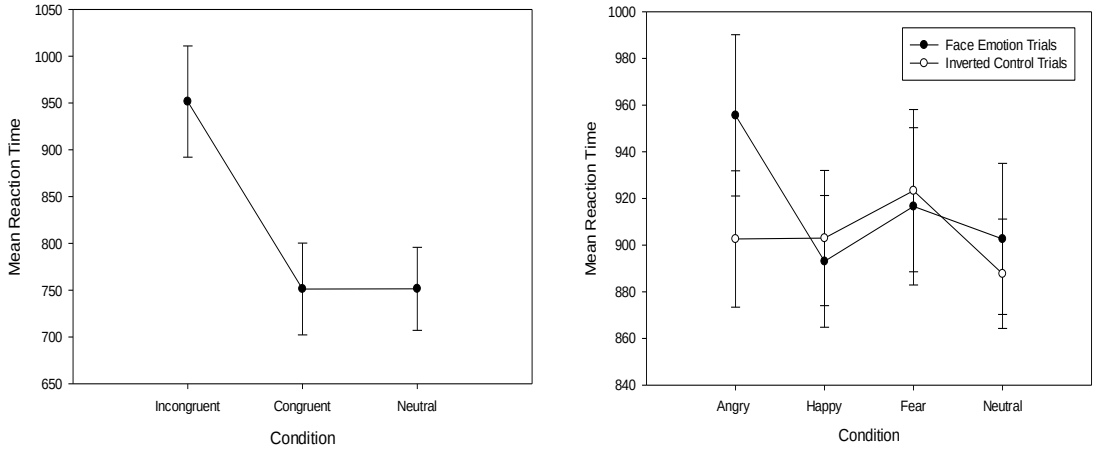

Figure 5. Mean reaction times for Flanker Task (incongruent, congruent and neutral conditions) and Schematic Stroop Task (Angry, Happy, Fear and Neutral face and corresponding control trial conditions) at Time 1.

$F(1,33) = 7.70$, $p = .009$, $\eta_p^2 = .19$, with significantly higher anxiety scores at T1 (M = 41.57) compared with T2 (M = 36.42). The analyses also showed a significant Group x Time interaction. Post-hoc analyses indicated a significant reduction in anxiety scores across time for participants in the intervention group only (see Table 3 and Figure 6). There was no significant group effect ($F < 2$, $p > .05$). To explore group differences at follow-up (controlling for T1 group differences in anxiety scores), a group (intervention, N = 15, control, N = 10) by time (T2 and T3) ANCOVA was carried out. This showed a significant main effect of group, $F(1, 22) = 26.09$, $p < .001$, post-hoc analyses indicating higher anxiety scores in the control group (M = 49.84), compared with the intervention group (M = 25.74). There was also a significant effect of the covariate T1 anxiety, $F(1,22) = 18.91$, $p < .001$. There was no significant main effect of time or group x time interaction ($F < 2$, $p > .5$).

Self-report Anxiety. Analyses from the repeated measure ANOVA show that there was a significant main effect for Time for self-report of anxiety, $F(2, 64) = 9.71$, $p < .001$, $\eta_p^2 = .23$. Post-hoc comparisons of the main effects indicated that there were significant improvements in scores from T1 to T2 and from T1 to T3 but not from T2 to T3. There was no significant group effect ($F < 2$, $p > .5$). A significant Group x Time

interaction was found, $F(2, 64) = 4.45$, $p = .015$, $\eta_p^2 = .122$. Post-hoc tests showed a significant reduction in anxiety from T1 to T2 for the intervention group but not from T2 to T3, indicating that reductions were maintained. No significant changes were found for the control group across T1-T3 (see Table 3 and Figure 6).

Teacher-report Anxiety. Analyses from a repeated measure ANCOVA (controlling for T1group differences in anxiety scores) showed a significant main effect of group for teacher-report anxiety, $F(1,32) = 16.072$, $p < .001$, $\eta_p^2 = .49$, (see Table 3 and Figure 6), with higher anxiety scores in the control group ($M = 23.63$), compared with the intervention group ($M = 13.60$). There was also a significant effect of the covariate T1 anxiety, $F(1,32) = 31.64$, $p < .001$. There was no significant main effect of time or group x time interaction ($F > 2$, $p < .1$).

Secondary Outcomes

Social Worries. A repeated measures ANOVA was conducted on the Social Worries Questionnaire (pupil and teacher versions). For the pupil version, a significant main effect for time was found, with a medium effect size, $F(1.68, 53.73) = 10.43$, $p < .001$, $\eta_p^2 = .246$. Post-hoc comparisons of the main effects indicated that there were significant improvements in scores from T1 to T2, from T2 and T3, and from T1 to T3. There was no main effect of group and no significant interaction between group and time (in both cases $F < 2$ and $p > .1$). For the teacher version, a significant main effect of time was found, with a medium effect size, $F(1.69, 55.75) = 10.27$, $p < .001$, $\eta_p^2 = .24$. Post-hoc comparisons of the main effects indicated that there were significant improvements in scores from T1 to T2 and from T1 to T3. There was no significant group effect ($F < 2$, $p > .5$). There was also a significant interaction between time and group, $F(1.69,55.75) = 5.23$, $p = .008$, $\eta_p^2 = .14$. Post-hoc tests showed a significant reduction in social worries from T1 to T2 and from T2 to T3 for the intervention group, indicating that improvements continued post-intervention. No significant changes were found for the control group across T1-T3 (see Table 3).

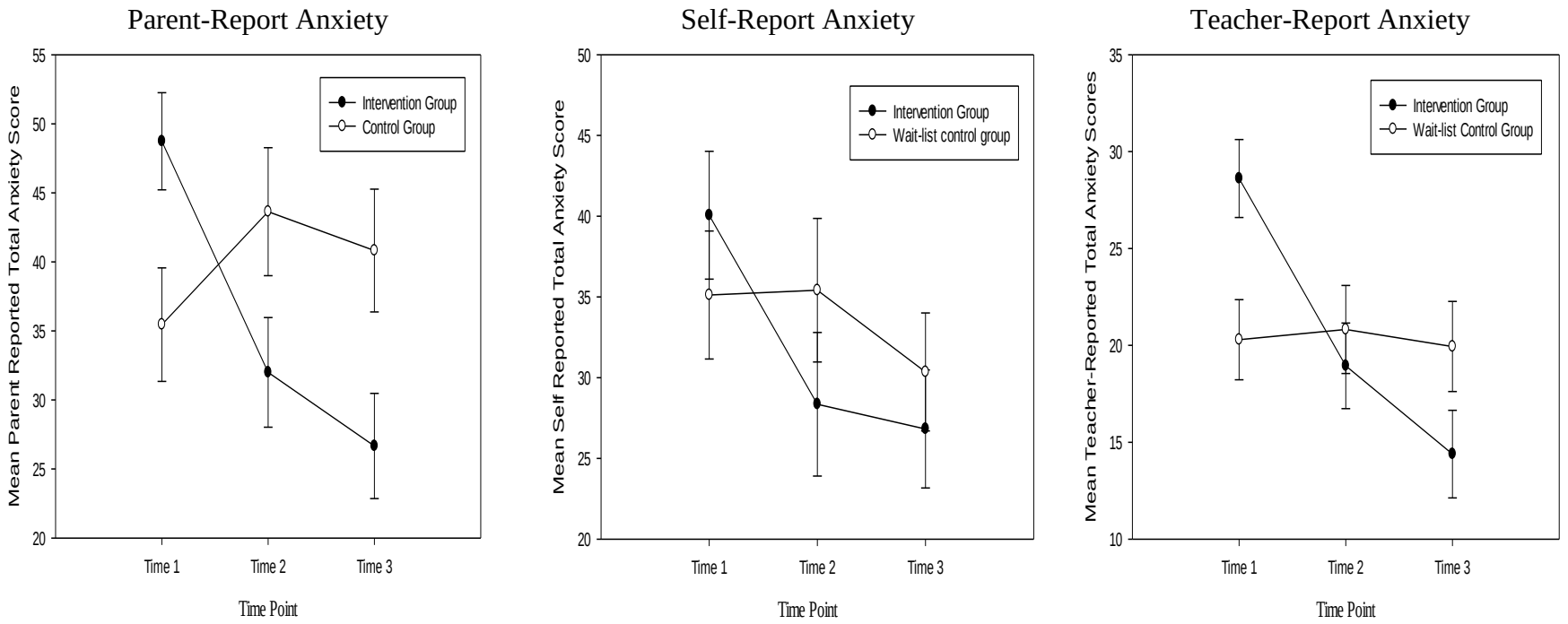

Figure 6. Mean Parent, Self and Teacher-Report Anxiety Scores and Standard Errors at T1, T2 and T3 for the intervention and wait-list control group.

Social Responsiveness. Taking into account attrition at follow-up, a repeated measures ANOVA for group (intervention, N = 18, control, N = 17) by time (T1 and T2) was initially conducted. Analyses showed that for parent-report social responsiveness, there was a significant main effect of time $F(1,33) = 9.20$, $p = .005$, $\eta_p^2 = .22$, with significantly higher social impairment reported at T1 (M = 112.95) compared with T2 (M = 103.98) (see Table 3 and Figure 4). There was no significant interaction between time and group and no main effect of group ($F < 2$, $p > .1$). To explore group differences at follow-up (controlling for T1 group differences in social responsiveness scores), a group (intervention, N = 15, control, N = 10) by time (T2 and T3) ANCOVA was carried out. This showed a significant main effect of time, $F(1, 24) = 4.85$, $p < .038$, $\eta_p^2 = .17$, indicating higher social impairment at T2 (M = 102.02), than at T3 (M = 99.90). There was no significant main effect of group or group x time interaction ($F > 2$, $p < .1$). For teacher-report social responsiveness, the results of a repeated measures ANOVA showed no significant main effect of time or group, and no significant interaction ($F < 2$. $p > .1$).

Attentional Control. Conflict scores on the flanker tasks (with higher conflict scores indicative of greater interference) were analysed using a repeated measures ANOVA. This showed a significant main effect for time, with a medium effect size, $F(2, 64) = 10.50$, $p < .001$, $\eta_p^2 = .247$. Post-hoc comparisons of the main effects indicated that there were significant improvements in scores from T1 to T2 and from T1 to T3 but not from T2 and T3. There was also a significant main effect for group, $F(1, 32)=8.07$, $p = .008$, $\eta_p^2 = .201$. There was no significant interaction between time and group, $F(2, 64) = 1.24$, $p = .297$, $\eta_p^2 = .037$. As a significant correlation between IQ and attentional control was identified, the analysis was therefore repeated using an ANCOVA (controlling for IQ). This showed a significant main effect of group, $F(1, 31) = 6.92$, $p = .013$, $\eta_p^2 = .182$, indicating that when variance in IQ is accounted for, the mean conflict score for the intervention group (M = 106.65) was significantly lower than that of the control group (M = 159.74). This suggests that at both T2 and T3, the intervention group showed improved attentional control in comparison to the control group (Figure

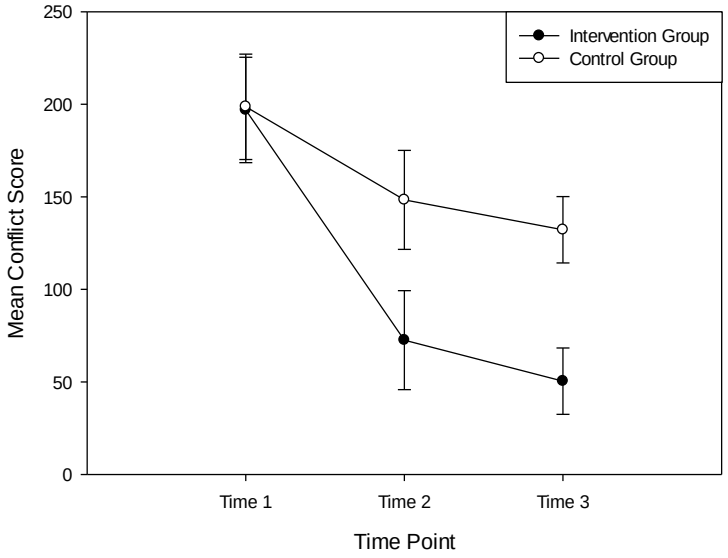

Figure 7. Mean Conflict Scores and Standard Errors for the Flanker Task at T1, T2 and T3 for the intervention and wait-list control group (controlling for IQ).

7)[3]. There was no significant main effect of time or an interaction between time and group ($F < 2$, $p > .1$).

Attention to Threat. Bias scores on the schematic face stroop task (positive bias scores indicating greater interference) were analysed using a repeated measures ANOVA. This revealed a significant main effect for trial type (Angry, Happy and Fear), $F(2, 64) = 9.39$, $p < .001$, $\eta_p^2 = .227$. Post hoc analyses using pairwise comparisons (using Bonferroni adjustment) showed that bias scores for the angry trials were significantly greater (mean BS = 38.97ms), compared with fear (mean BS = 9.43ms) and happy trials (mean BS = (-7.26ms). This suggests that across the sample, participants experienced significantly greater interference from the angry faces. There was no significant main effect of time or group and no significant interaction effects ($F < 2$, $p > .1$).

Understanding Group Change as a Result of the Interventions

[3] Post-hoc analyses indicated significant group differences at T2, t(33) = -2.30, p = .02, and T3, t(32) = -3.42, p = .002. Furthermore, for the intervention group, post-hoc analyses indicated that there were significant improvements in scores (with level of interference decreasing) from T1 to T2 and from T1 to T3 but not from T2 to T3. For the control, no significant differences were found between any of the three time points.

It was hypothesised that reduced anxiety would impact more broadly to increase attentional control, decrease attention to threat, reduce social worry and to increase social responsiveness. Therefore correlations were calculated to identify whether changes in these variables were linked to changes in anxiety over the course of the intervention. Change scores were used in this correlation and were calculated between T1 and T2 for each dependent variable by subtracting T1 scores from T2 scores and for T1 and T3 by subtracting T1 scores from T3 scores. For anxiety, a positive value indicated an increase in anxiety whereas a negative value indicated a decrease in anxiety over time. For social responsiveness, a positive value indicated an increase in the severity of social impairment whereas a negative value indicated an increase in social responsiveness over time. For attentional control and attention to threat, a negative score indicated less interference (i.e. an improvement) and a positive score indicated increased interference.

Correlations between the T1 to T2 change scores showed consistency between parent-report, self-report and teacher-report anxiety (see Table 5) and this is consistent with the group analysis. The correlations also indicate that a positive change in social responsiveness, as reported by teachers, was linked to decreased anxiety across groups. Parent-report anxiety positively correlated with change in fear bias score on the schematic face task, indicating that as anxiety reduces over time, this is associated with reduced interference when looking at fear-specific stimuli. Correlations between T1 and T3 change scores (see Table 6) showed a significant correlation between self-report anxiety and parent-report social responsiveness, indicating that a positive change in social responsiveness as reported by parents was linked to a decrease in anxiety over time. A change in attentional control or attention to threat was not associated with any significant change in anxiety.

Table 5.

Correlations Between T1 to T2 Change Scores for Anxiety (Parent, Self and Teacher-report), Social Worry, Social Responsiveness, Attentional Control and Attention to Threat (Change Score = T2 - T1).

Variables		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Anxiety	1. Parent	1	.359*	.329	.581**	.215	.319	.422*	.044	.187	-.088	.454**
	2 Self		1	.428*	.414*	.042	.096	.386*	.235	.310	.024	-.019
	3 Teacher			1	.197	.596**	.085	.429*	.080	-.058	-.010	-.122
Social Worry	4 Self				1	.025	.111	.150	-.008	.162	-.068	-.032
	5 Teacher					1	.255	.239	.131	.002	-.139	-.142
Social Impairment	6 SRS-P						1	.270	.015	.092	-.127	-.310
	7 SRS-T							1	-.140	.117	-.098	-.280
Attention Control	8 Conflict Score								1	.132	-.067	-.005
Attention to threat	9 Happy Bias									1	.084	.059
	10 Angry Bias										1	.641**
	11 Fear Bias											1

Note. Parent-report anxiety measured by the Spence Children's Anxiety Scale - Parent (SCAS-P), Self-report anxiety measured by Spence Children's Anxiety Scale (SCAS), Teacher-report anxiety measured by School Anxiety Scale - Teacher Report (SAS-TR), Social Worries measured by Social Worries Questionnaire - Pupil (SWQ-P) and Social Worries Questionnaire - Teacher (SWQ-T). Social Impairment measured by Social Responsiveness Scale Parent (SRSP) and Teacher (SRST), Attentional control measured by Flanker Task, Attention to Threat measured by Schematic face task.

#p < .1, **p* < .05, ***p* < *.001*

Table 6.

Correlations Between T1 to T3 Change Scores for Anxiety (Parent, Self and Teacher-report), Social Worry, Social Responsiveness, Attentional Control and Attention to Threat (Change score = T3 - T1)

Variables		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Anxiety	1. Parent	1	.400*	.425*	.507**	.133	.144	.240	.309	.233	-.147	.299
	2 Self		1	.506**	.266	.116	.482*	.204	.253	.342	-.128	-.212
	3 Teacher			1	.102	.688**	.159	.430**	.144	.162	.006	-.003
Social Worry	4 Self				1	.177	.166	.101	.148	.205	-.040	.236
	5 Teacher					1	.166	.479**	-.096	-.182	-.132	.207
Social Impairment	6 SRS-P						1	.491**	.113	.358	-.206	-.182
	7 SRS-T							1	.001	.213	-.076	.027
Attention Control	8 Conflict Score								1	.308	.178	.124
Attention to threat	9 Happy Bias									1	.490**	.272
	10 Angry Bias										1	.667**
	11 Fear Bias											1

Note: Parent-report anxiety measured by the Spence Children's Anxiety Scale- Parent (SCAS-P), Self-report anxiety measured by Spence Children's Anxiety Scale (SCAS), Teacher-report Anxiety measured by School Anxiety Scale - Teacher Report (SAS-TR), Social Worries measured by Social Worries Questionnaire - Pupil (SWQ - P) and Teacher (SWQ-T), Social impairment measured by Social Responsiveness Scale Parent (SRSP) and Teacher (SRST), Attentional Control measured by Flanker Task, Attention to threat measured by Schematic face task.

#$p < .1$, *$p < .05$, **$p < .00$.

Understanding Change at an Individual Level

Whilst statistical significance and effect size inform about group differences, it is argued that they may not capture meaningful changes that occur on an individual basis (Jacobseon & Truax, 1991). Therefore, following the methodology proposed by Jacobson and Truax (1991), reliable and clinically significant change was computed for each of the primary variables. This enabled exploration of change at the level of the individual, taking into consideration measurement variability (Evans, Margison & Barkham, 1998). Reliable change scores were calculated to consider change for each participant between T1 and T2 and between T1 and T3, using the following formula:

$$RC = \frac{x_2 - x_1}{s_{diff}}$$

where $x_1$is the participant's pre-intervention score, x_2 is the participant's post-intervention score and s_{diff} is calculated from the standard error of measurement. The working of this formula is shown in more detail in Appendix O. The figures in Appendix P show the change scores in relation to the reliable change index for T1-T2 and T2-T3 change for each of the primary measures.

To determine whether those participants who met the criteria for reliable change also reached clinical significance, the following formula was used (Jacobson & Truax, 1991):

$$\frac{(mean_{clin}\ x\ SD_{norm}) + (mean_{norm}\ x\ SD_{clin})}{SD_{norm} + SD_{clin}}$$

Clinically significant change (CSC) Criterion *c* (see Evans et al., 1998*)* was used as normative data samples were available for parent-report anxiety (SCAS-P) and self report anxiety (SCAS).[4] As there is currently no normative data available for teacher-report anxiety (SAS-TR) a change score was not calculated.

[4] SCAS-P data norms were collected from Nauta, Scholing, Rapee, Abbott, Spence & Waters, 2004; SCAS data norms were collected from Spence, Barrett & Turner, 2003. Dysfunctional data was drawn from the data set.

Table 7.

Reliable change indexes for parent, self and teacher report anxiety for T1-T2 and T1-T3.

		Intervention Group			Control Group		
	Reliable change criterion	**Reliably deteriorated**	**No reliable change**	**Reliably improved**	**Reliably deteriorated**	**No reliable change**	**Reliably improved**
			T1-T2				
Parent-report	19.06	0	12 (66.67%)	6 (33.33%)	3 (17.65%)	14 (82.35%)	0
Self-report	18.50	0	11 (61.11%)	7 (38.89%)	1 (5.88%)	15 (88.24%)	1 (5.88%)
Teacher-report	8.15	0	9 (50%)	9 (50%)	1 (5.88%)	15 (88.24%)	1 (5.88%)
			T2-T3				
Parent-report	19.39	0	5 (33.33%)	10 (66.67%)	2 (18.18%)	8 (72.73%)	0 (9.09%)
Self-report	21.36	0	12 (70.59%)	5 (29.41%)	0	17 (100%)	0
Teacher-report	11.28	0	8 (44.44%)	10 (55.56%)	1 (5.88%)	15 (88.24%)	1 (5.88%)

Note: Parent-report anxiety measured by the Spence Children's Anxiety Scale- Parent (SCAS-P), Self-report anxiety measured by Spence Children's Anxiety Scale (SCAS), Teacher-report Anxiety measured by School Anxiety Scale - Teacher Report (SAS-TR).

For parent-report anxiety, six of eighteen (33.33%) participants in the intervention group met the criteria for reliable change post-intervention, achieving reliable reductions in parent-report anxiety (see Table 7 and Appendix P). Of those six participants, five also met criteria for clinically significant change. For the wait-list control group, three of 17 (17.65%) participants met criteria for reliable change post-intervention. The scores for these participants demonstrated a deterioration however, with an increase in anxiety. At follow-up, a greater percentage of children in the intervention group (10 of 15, 66.67%) met criteria for reliable change. Eight of the ten participants (80%) also met criteria for clinically significant change. In the wait-list control group two of 11 (18.18%) participants met criteria for reliable change, although again all participants showed an increase in anxiety scores, indicating reliable deterioration.

For self-report anxiety, seven of eighteen (38.89%) participants in the intervention group met criteria for reliable change post-intervention, achieving reliable reductions in self-report anxiety (see Table 7 and Appendix P). Of those seven participants, six also met criteria for clinically significant change. For the wait-list control group, 2 of 17 (11.76%) participants met criteria for reliable change post-intervention. The score for only one of these participants reflected a reduction in anxiety however, also reaching clinical significance. At follow-up, five children in the intervention group (5 of 17, 29.41%) continued to meet criteria for reliable change. Four of these participants also met criteria for clinically significant change. None of the participants in the wait-list control group met criteria for reliable change at follow-up.

For teacher-report anxiety, 9 of 18 (50%) participants in the intervention group met criteria for reliable change post-intervention, achieving reliable reductions in anxiety (see Table 7 and Appendix P). For the wait-list control group, 2 of 18 (11.11%) participants met criteria for reliable change post-intervention. The score for one of these participants demonstrated deterioration however, with an increase in teacher-report anxiety. At follow-up, a greater percentage of children in the intervention group (10 of 18, 55.56 %) met criteria for reliable change. In the wait-list control group, there was no change.

Between T1 and T2, only one participant in the intervention group met the criteria for reliable change in all three measures (see Table 8). Two participants showed reliably significant change for both parent and teacher-report and one for both self and teacher-report. Between T1 and T3, three participants in the intervention group met the criteria for reliable change in all three measures.

Exploratory Analysis of Variables associated with Anxiety Change

As considerably more children in the intervention group achieved positive outcomes, it is therefore helpful to consider what factors might be related to the intervention success. To do so, an exploration of descriptive data on the six most positive treatment-responders and the six least positive treatment-responders was conducted for parent-report, self-report and teacher-report.[5] Post-intervention change

[5] The six most- and least-highest responders were selected as this was the minimum number of positive responders for each individual measure, allowing consistency of exploration.

scores were used. Table 9 shows mean scores on all continuous variables at baseline for the two subgroups of participants. Means were compared by calculating Cohen's *d* for each measure.[6] The analysis for parent-report anxiety only suggests that children who responded positively to the intervention differed from non-responders in their total IQ score only, with the higher responders having a significantly higher mean IQ than the least responders. In contrast, the analyses for self and teacher-report anxiety suggest that higher responders have a lower mean IQ than the least responders. No further effect sizes of >.50 were computed.

[6] As recommended by Cohen (1988), effect sizes exceeding .50 (medium) are considered to show a worthy difference and are reported.

Table 8.

Reliable change and clinical change status for individual participants in the intervention group for the three primary anxiety measures.

	T1 - T2							T1 - T3					
	Parent-report		Self-report		Teacher-report			Parent-report		Self-report		Teacher-report	
Participan	RSC	CSC	RSC	CSC	RSC	CSC		RSC	CSC	RSC	CSC	RSC	CSC
1	Y	Y	Y	Y	Y	-	**	Y	Y	Y	Y	Y	-
2	Y	N	N	N	Y	-	*	Y	N	N	N	Y	-
3	Y	Y	N	Y	Y	-	**	Y	Y	Y	Y	Y	-
4	Y	Y	N	N	N	-		Y	Y	N	N	N	-
5	Y	Y	Y	Y	N	-		N	DNC	Y	Y	N	-
6	Y	Y	N	N	N	-		Y	Y	N	Y	N	-
7	N	Y	Y	Y	Y	-	*	Y	Y	N	Y	Y	-
8	N	Y	Y	Y	N	-		N	Y	Y	Y	N	-
9	N	N	N	N	N	-		Y	Y	N	N	N	-
10	N	N	N	N	N	-		N	Y	N	N	Y	-
11	N	Y	N	N	Y	-	*	Y	Y	N	Y	Y	-
12	N	N	Y	N	Y	-	**	Y	N	Y	N	Y	-
13	N	N	N	N	Y	-		Y	Y	N	Y	N	-
14	N	N	Y	Y	N	-		N	N	N	N	Y	-
15	N	N	N	Y	N	-		N	N	N	Y	N	-
16	N	N	N	Y	Y	-		N	DNC	N	N	Y	-
17	N	N	Y	Y	N	-		N	DNC	N	N	N	-
18	N	N	N	N	N	-		N	N	N	N	Y	-

Note. RCI = Reliable change index significance, CSC = clinically significant change, DNC = Did not complete.** Reliable change for all three measures, *Reliable change in two measures.

Table 9.

Baseline Means, Standard Deviations and Effect Sizes of measures for the most and least responders in the intervention group.

	Most-Positive		**Least-Positive**		
	Mean	SD	Mean	SD	Effect
Parent-report Responders					
Age	12.77	.89	13.50	.62	-.43
IQ (Verbal)	105.67	17.37	91.67	15.17	.39
IQ (Total)	117.33	22.77	93.00	12.68	.55
Social Communication	19.00	3.41	18.83	6.01	.01
Social Responsiveness	122.83	8.01	102.50	35.32	.37
Social Responsiveness	90.50	35.92	92.67	28.54	0.03
Parent-report Anxiety	54.50	13.17	42.67	20.37	.33
Self-report Anxiety	40.00	15.84	38.67	13.05	.05
Teacher-report Anxiety	24.50	11.27	31.00	5.90	-.34
Self-report Responders					
Age	13.11	1.09	13.12	.71	-.005
IQ (Verbal)	98.83	8.84	103.17	20.43	-.14
IQ (Total)	97.83	7.63	115.67	24.88	-.44
Social Communication	19.67	6.13	19.33	3.93	.03
Social Responsiveness	111.83	17.02	114.67	15.11	-.09
Social Responsiveness	88.83	22.41	91.00	39.51	-.03
Parent-report Anxiety	56.67	12.48	45.17	18.72	.34
Self-report Anxiety	52.17	20.54	32.83	15.25	.47
Teacher-report Anxiety	25.83	22.41	24.17	10.34	.05
Teacher-report Responders					
Age	13.25	1.09	13.35	1.02	-.05
IQ (Verbal)	96.33	16.62	102.33	21.37	-.15
IQ (Total)	99.83	15.46	110.67	27.35	-.24
Social Communication	17.33	3.01	19.83	4.49	-.31
Social Responsiveness	100.67	35.22	120.50	21.32	-.32
Social Responsiveness	100.00	33.27	80.00	28.76	.31
Parent-report Anxiety	53.67	22.46	44.50	15.55	.23
Self-report Anxiety	50.00	21.04	38.00	13.53	.32
Teacher-report Anxiety	33.00	3.52	24.83	11.58	.43

Note. Parent-report anxiety measured by the Spence Children's Anxiety Scale - Parent (SCAS-P), Self-report anxiety measured by Spence Children's Anxiety Scale (SCAS), Teacher-report anxiety measured by School Anxiety Scale - Teacher Report (SAS-TR), Social Impairment measured by Social Responsiveness Scale Parent (SRSP) and Teacher (SRST), IQ - Full scale IQ score as measured by Weschler Abbreviated Scale of Intelligence.

Discussion

Whilst previous research has explored and supported the efficacy of CBT interventions for use within the ASD population through clinic-based study and for the majority, using clinical samples (for a review see Lang et al., 2010), few studies have assessed their effectiveness using community-derived samples within the school context. The aim of the current study was therefore to explore whether anxiety could be reduced in adolescents with ASD through a school-based, CBT intervention. As hypothesised, the current findings show that in comparison to a wait-list control group, adolescents with ASD who completed the 'Exploring Feelings' intervention showed statistically significant greater reductions in anxiety. This finding was consistent across parent, self and teacher-report, with medium effect sizes demonstrated for each. This suggests that skills taught were generalised to contexts outside of the teaching environment, with notable effects reported both at school and at home. This is a particularly salient finding, as only one other study exploring the effectiveness of CBT for young people with ASD has utilised both parent and school reports and reported a generalisation of effects across settings (Chalfant et al., 2007).

The significant association identified between baseline parent and self-reports of anxiety is worthy of further consideration, in view of previous research having shown that young people with ASD often provide less coherent representations of emotional experiences than their typical peers (Losh & Capps, 2006). Such findings have lead to questioning of the utility and accuracy of using self-reports to assess anxiety in young people with ASD (Mazefsky, Kao & Oswald, 2011).Whilst it is helpful to acknowledge that the core deficits associated with ASD may complicate the assessment of anxiety, support for the utility of multi-informant assessment which includes self-report is emerging (e.g., Farrugia & Hudson, 2006) and this study adds to this.

Group differences were maintained six weeks post-intervention, both at school and at home. Previous findings suggest that for school-based interventions to be effective in terms of both the generalisation and maintenance of effects, there is a need for teachers to incorporate strategies that promote these qualities such as training in natural settings and using natural consequences to reinforce new behaviours (Machalicek et al., 2008). In view of this, the generalization of target skills may require

additional training for the teaching staff and parents who are present in the environments where generalization is desired. In the current study, front-line school staff were directly involved in the intervention delivery and therefore may have fulfilled these additional recommendations. Moreover, the use of home-projects allowed practice opportunities at home and to some degree, involvement of parents.

In addition to group change, a noteworthy proportion of participants in the intervention group met the criteria for both reliable and clinically significant change. This indicates that further to the statistically significant improvements in anxiety found at a group level, individual participants demonstrated reliably significant change, which is not attributable to error of measurement, and also clinical change, moving from a dysfunctional to a functional population range. This is an important finding, in view of reports which suggest that more than 55% of young people with ASD experience clinical levels of anxiety (De Bruin et al., 2006) and would therefore fall within the dysfunctional norm. This finding further strengthens the utility of this particular intervention and suggests its effectiveness within both clinical and non-clinical populations. Further exploratory analysis suggested a possible association between treatment response and IQ, with higher-treatment responders (as measured by parent-report) scoring greater on average in an IQ measure. This finding is consistent with previous results which have shown greater treatment response in young people with Autism to be associated with higher cognitive functioning (Hopkins et al., 2011). This finding was however not consistent across informants. In contrast to parent-report, for both self-report and teacher-report, higher-treatment responders scored lower on average in an IQ measure , although this was not a significant effect.

The improvements in anxiety following a CBT group-based intervention are consistent with the findings of previous studies in young people with ASD (for example McNally et al., 2013; Reaven et al., 2012). Moreover, following on from the original study conducted by Sofronoff et al. (2005), the current study offers additional support for the Exploring Feelings intervention (Attwood, 2004). This brief group-based intervention, designed specifically for use with young people with ASD, supports a number of recent modification trends in developing CBT interventions for this population, in terms of both its delivery and content (for a review see Moree & Davis, 2010). As recommended, the intervention used a coping model rather than a curative

model (Beebe & Risi, 2003), a more directive teaching approach (Anderson & Morri, 2006), incorporated the use of both concrete, visual tactics and role-play, allowing mastery of skills (Attwood, 2000) and to aid generalisation of skills taught, included in vivo home-projects (Anderson & Morri, 2006).

The secondary hypothesis was partially supported, with reductions in anxiety being significantly associated with teacher-report social responsiveness, although group differences were not found to be significant. Previous research has suggested that for young people with ASD, social impairments may not only precipitate anxiety but also be exacerbated by anxiety (Bellini, 2006; Gillot et al., 2001; White et al., 2013). Whilst the current study supported the previous finding of an association between anxiety and social reciprocity (Sukhodolsky et al., 2008), only the reduction in teacher-report anxiety was found to significantly correlate with an improvement in social responsiveness. Whilst it may be inferred that this improvement in social reciprocity may be attributed to the decrease in anxiety, the correlation does not allow affirmative conclusions regarding causality to be drawn. Furthermore, it must also be noted that although the intervention did not specifically incorporate a social-skills based module, the group-based format offered social learning opportunities through shared group activities. In view of this, previous research has shown that young people with ASD can show difficulty in generalising taught social skills to contexts outside of the teaching environment (Bellini et al., 2007; White et al., 2007). This may offer a plausible explanation as to why parent-report reductions in anxiety were not also associated with an improvement in parent-report social responsiveness. Further research is however needed to develop a greater understanding of this relationship.

Following theoretic models which link the cognitive component of anxiety to attentional control and attention to threat cues, the current study also explored the impact of an anxiety-based intervention on attentional skills in two domains: attentional control and attention to threat. The intervention group showed significant improvement in attentional control in comparison to the control group, when IQ was controlled for. In addition, the intervention group made substantial improvements in attention to threat (for angry stimulus) in comparison to the wait-list control group, although these did not reach statistical significance. Although affirmative conclusions cannot be drawn from these findings, they do suggest that this is again an area warranting further investigation.

Moreover, the data offers somewhat preliminary support for the application of the processing efficiency theory model (Eysenck et al., 2007) to young people with ASD, suggesting that reducing anxiety may have a wider impact in improving attentional skills as shown in typically developing children (Bar-Haim et al., 2007). This study offers an important first step towards understanding this relationship, a necessity in view of studies which have demonstrated strong links between attention-related behaviours and academic performance (Fleming et al., 2004; Merrell & Tymms, 2001).

Finally, the hypothesis that social worry would decrease following intervention, was also moderately supported, with significantly greater reductions in teacher-report social worries found in the intervention group, with further improvements found at the six-week follow-up. This finding was not confirmed through self-reports of social worry however. The discrepancy identified between the two sources within this domain may be interpreted in several ways. It may be that contrary to previous findings (Farrugia & Hudson, 2006), this study does not lend support for the capacity of young people with ASD to identify negative cognitions, here in the form of social worries. It may however support previous findings of a discrepancy in self-reports and others' reports of social functioning in ASD populations (Lerner, Calhoun, Mikami & Reyes, 2012). Finally, given research suggesting that not all young people with ASD show desire for social relationships (Bauminger & Kasari, 2000), it may be that the questions presented were inconsistent to the social expectations and wishes of some of the young people participating in this study.

Limitations

The current study found positive benefits of a relatively short-term, school-based CBT intervention for adolescents with ASD on anxiety; there are however limitations to consider. Although all participants had a previous diagnosis of ASD from a reliable health professional, and a screening tool was used to validate this diagnosis, due to the financial constraints of the researcher a comprehensive research-diagnostic evaluation verifying these diagnoses was not possible. In future, it would be beneficial to conduct a comprehensive diagnostic assessment using standardised measures such as the ADI-R (Rutter et al., 2003) or the ADOS (Lord et al., 2000) to corroborate diagnoses. Given that the study was conducted in a community setting, rather than a designated research

clinic, several other methodological issues arise. Firstly, treatment integrity was not formally measured by the researchers. The findings of this study could be interpreted with greater confidence if recorded therapy sessions were checked for integrity by raters who were blind to the study's aims. Secondly, no therapist time was spent with the wait-list control group. Spending an equivalent amount of time with the intervention and control groups could help to ensure that the benefits of the intervention could be attributed to the intervention alone and not to time spent with a therapist. In addition, the study did not attempt to directly compare the intervention with other treatment models. Thirdly, the raters were not blinded to condition allocation at post-intervention or follow-up. Finally, the period of follow-up was short-term. Longer term follow-up assessment of outcomes would yield useful information towards determining the durability of findings. The consistent pattern of results across several information sources does however seem to provide added confidence to the findings.

Implications and Future Directions

Notwithstanding these limitations, this study contributes to the literature supporting the efficacy of a school-based CBT intervention for anxious adolescents with ASD. In view of the increased emphasis on schools to provide inclusive education (DfE, 1997; DfES, 2001, 2004) and effective, evidence-based interventions (DfE, 2013), this research may inform educational provision for young people with ASD. With research demonstrating young people with ASD to be a population susceptible to anxiety (White et al., 2009), a clear understanding of the effectiveness of interventions such as the Exploring Feelings programme is important. With an ever-increasing understanding of the school-based factors which may contribute to the development of this anxiety (Humphrey & Lewis, 2008; Mesibov & Shea, 1996) and acknowledgement that young people with ASD have shown difficulty in the generalisation of skills taught (Bellini et al., 2007; White et al., 2007), developing the evidence-base for interventions which can be delivered within school is essential. Moreover, in the current economic and educational climate, the potential cost-effectiveness of a group-delivered intervention should not be overlooked.

The present study provides initial evidence that CBT delivered within the school context may be effective in reducing anxiety in adolescents with ASD. Future research

is however needed to replicate and, therefore, confirm these findings. In addition, it will be important to determine whether such findings can be replicated with school staff delivering the interventions, following appropriate training. Continued research within this area should consider increasing the sample size, the inclusion of an active control group and greater rigour in the diagnosing of participants for research-purposes. Based on the results of the current study, future research may also consider exploring the efficacy and feasibility of a school-based intervention which aims to both reduce anxiety and increase social competency. Although both previous research (Bellini, 2006; Gillot et al., 2001; White et al., 2013) and the current study demonstrate a plausible association between the two domains, little attention has been given to determining the effectiveness of a combined intervention. Whilst research is starting to show the efficacy and feasibility of such an intervention (White et al., 2013), further study is required and, as addressed in this study, there continues to be a need for school-based research. Finally, as research as demonstrated the efficacy of a family-based CBT intervention, with the involvement of parents (Sofronoff et al., 2005), it would be beneficial to consider the impact of parents' involvement in a school-based intervention and whether this strengthens both the effects reported.

In summary, the current study extended previous research to explore the impact of school-based CBT on anxiety in young people with ASD. The results provide preliminary evidence to support the proposition that a school-based intervention can reduce anxiety as reported by multiple-informants. Further research is necessary to address both methodological limitations and further understand the wider implications of an anxiety-based CBT intervention in supporting young people with ASD

Appendices

Appendix A – Excluded studies

Appendix B - Included Papers Data Extraction (Anxiety)

Appendix C - Included Papers Data Extraction (Social Skills)

Appendix D - School Anxiety Scale - Teacher Report

Appendix E - Spence Children's Anxiety Scale

Appendix F - Spence Children's Anxiety Scale - Parent

Appendix G - Social Worries Questionnaire - Pupil

Appendix H - Social Worries Questionnaire - Teacher

Appendix I - Research Governance and Ethics Consent from University of Southampton

Appendix J - School Information Sheet

Appendix K - Parent Information Sheet and Consent Form

Appendix L - Pupil Information Sheet and Assent Form

Appendix M - Parent Debrief Letter

Appendix N - Pupil Debrief Letter

Appendix O - Reliable Change Calculation Example

Appendix P - Reliable Change Figures

Appendix A

Studies for Literature Review Excluded after Full Text Assessment

Reference	Rationale for exclusion
Baghdadli, A., Brisot, J., Henry, V., Michelon, C., Soussana, M., Rattaz, C., & Picot, M. C. (2013). Social skills improvement in children with high-functioning autism: a pilot randomized controlled trial. *European child & adolescent psychiatry*, *22*(7), 433-442. doi: 10.1007/s00787-013-0388-8.	**Did not include anxiety or social skills as a primary outcome measure.** This study compared the effect of a Social Skills Training Group-based Program (SST-GP) and a Leisure Activities Group-based Program (LA-GP) on the perception of facial emotions and quality of life in young people with ASD.
Bauminger, N. (2002). The facilitation of social-emotional understanding and social interaction in high-functioning children with autism: Intervention outcomes. *Journal of Autism and Developmental Disorders, 32*(4), 283-298. doi: 10.1023/A:1016378718278.	**Did not include a control group.** This study evaluated the effectiveness of a 7-month cognitive behavioural intervention for the facilitation of the social-emotional understanding and social interaction of 15 high-functioning children with autism. There was no control group comparison.
Begeer, S., Gevers, C., Clifford, P., Verhoeve, M., Kat, K., Hoddenbach, E., & Boer, F. (2011). Theory of mind training in children with autism: A randomized controlled trial. *Journal of autism and developmental disorders*, *41*(8), 997 - 1006. doi: 10.1007/s10803-010-1121-9.	**Did not include anxiety or social skills as a primary outcome measure.** The current study used a randomized controlled design to test the effectiveness of a 16-week Theory of Mind treatment in children with ASD. The primary outcomes measured were theory of mind and emotional understanding.
Ben-Sasson, A., Lamash, L., & Gal., E. (2013). To enforce or not to enforce? The use of collaborative interfaces to promote social skills	**Did not include a control group.** This study examined the effectiveness of a collaborative puzzle game in

in children with high functioning autism spectrum disorder. *Autism, 17 (5)*, 608-622. doi: 10.1177/1362361312451526.	increasing positive social behaviours in children with ASD. A control trial methodology was not employed.
Drahota, A., Wood, J. J., Sze, K. M., & Van Dyke, M. (2011). Effects of cognitive behavioral therapy on daily living skills in children with high-functioning autism and concurrent anxiety disorders. *Journal of autism and developmental disorders, 41*(3), 257-265. doi: 10.1007/s10803-010-1037-4	**Did not include anxiety or social skills as a primary outcome measure.** Although this study explored the effectiveness of a CBT-based anxiety intervention, the primary outcome measure assessed children's daily living skills.
Epp, K. M. (2008). Outcome-based evaluation of a social skills program using art therapy and group therapy for children on the autism spectrum. *Children & Schools, 30*(1), 27-36. doi: 10.1093/cs/30.1.27.	**Did not include a control group.** This study examined the effectiveness of a social skills therapy program for school-age children with ASD. The program used art therapy and cognitive-behavioural techniques in a group therapy structure. There was no control group comparison.
Puleo, C. M., & Kendall, P. C. (2011). Anxiety disorders in typically developing youth: autism spectrum symptoms as a predictor of cognitive-behavioral treatment. *Journal of Autism and Developmental Disorders, 41*(3), 275-286. doi: 10.1007/s10803-010-1047-2.	**Participants did not have an ASD diagnosis.** Although the study assessed ASD symptoms, participants were typically developing, anxiety-disordered children with no formal ASD diagnosis.
Reaven, J., Blakeley-Smith, A., Leuthe, E., Moody, E., & Hepburn, S. (2012). Facing your fears in adolescence: Cognitive-behavioral therapy for high-functioning autism spectrum disorders and anxiety. *Autism research and treatment, 2012*. doi: 10.1155/2012/423905.	**Did not include a control group.** Twenty-four adolescents, completed the Facing Your Fears Anxiety intervention. Results indicated significant reductions in anxiety severity and interference post treatment. A control trial methodology was not

	utilised.
Russell, A. J., Jassi, A., Fullana, M. A., Mack, H., Johnston, K., Heyman, I., Murphy, D. G., & Mataix-Cols, D. (2013). Cognitive behavior therapy for comorbid obsessive-compulsive disorder in high-functioning autism spectrum disorders: a randomized controlled trial. *Depression and Anxiety, 30(8)*, 697-708. doi: 10.1002/da.22053. doi: 10.1002/da.22053.	**Included data from adult participants.** The study compared the effectiveness of two CBT-based interventions for anxious adolescents and adults with ASD. The findings did not separate participants based upon age and therefore it was not felt appropriate for inclusion in this review. In addition, the intervention targeted a very specific population; participants were required to have a comorbid diagnosis of OCD.
Solomon, M., Goodlin-Jones, B. L., & Anders, T. F. (2004). A social adjustment enhancement intervention for high functioning autism, asperger's syndrome and pervasive developmental disorder NOS. *Journal of Autism and Developmental Disorders, 34*, 649-668. doi: 10.1007/s10803-004-5286-y.	**Did not include anxiety or social skills as a primary outcome measure** This study looked at the impact of a social adjustment curriculum on three key areas: emotion recognition and understanding; theory of mind; and executive functions/real life type problem solving. It included a measure of depression. It did not assess observable social skills or anxiety symptomology.
Tse, J., Strulovitch, J., Tagalakis, V., Meng, L., & Fombonne, E. (2007). Social skills training for adolescents with Asperger syndrome and high-functioning autism. *Journal of autism and developmental disorders, 37*(10), 1960-1968. doi: 10.1007/s10803-006-0343-3.	**Did not include a control group.** Six groups of adolescents (n = 46) with Asperger's Syndrome completed a 12-week social skills group. Parent-report and self-report was used to survey social skills pre and post intervention. A control trial methodology was not utilised.

Appendix B

Included Papers Data Extraction: Studies investigating interventions aimed at addressing Anxiety Symptomology

Study Reference	Study Design	Target Sample	Intervention	Outcome Measures	Key Results
Fujii, Renno, McLeod, Lin, Decker, Zielinski & Wood (2013)	RCT Intervention Vs Treatment As Usual Control. Pre and Post testing. Single blind (Independent evaluators)	**Characteristics:** Met research criteria for ASD (Autism n = 11, PDD-NOS n = 1) and at least one anxiety disorder. Living in Los Angeles. 95% Caucasian. **N (% Male):** 12 (75%) **Age Range:** 7-11 years **Mean Age:** 8.8 years	**Experimental Group (n = 7):** Therapist led manual-based 1:1 CBT programme, according to the Building Confidence programme. Programme: 32 x 90min weekly sessions, including individual child and parent session and conjoint sessions. Clinic-based. **Control Group (n = 5*):*** 16 week treatment as usual.	Anxiety: ADIS - C ADIS - P (including Clinical Severity Rating)	71.4% of Intervention condition no longer met diagnostic criteria for anxiety disorder post-intervention, 100% of TAU continued to meet criteria. The CSR scores significantly differed by treatment group at post Intervention/ Post TAU[1]
McNally, Lincoln, Brown & Chavira (2013)	CT - stratified randomisation	**Characteristics** Diagnosed with ASD and at least one	**Experimental Group (n = 12):** Psychologist led manualized group CBT programme according to the	Anxiety: Parent-Report: ADIS-P	58% of Intervention condition no longer met diagnostic criteria

	(based on age, IQ, anxiety severity) Intervention Vs Wait-list Control. Pre and Post testing. Follow up (2 months post-intervention).	primary anxiety disorder (Separation Anxiety Disorder, Generalised Anxiety Disorder or Social Phobia). Living in Southern California. 56% Caucasian. **N (% male):** 22 (95%) **Age Range:** 8 - 14 years. **Mean Age:** 11.26 years	Coping Cat programme (modified for ASD sample). <u>Programme:</u> 16 weekly 1:1 sessions, homework assignments. **Control Group (n = 10):** 16 week treatment as usual.	SCAS - P Self- Report: SCAS - C	for anxiety disorder post-intervention, 100% of WL continued to meet criteria, Cohen's d = 1.15[1] **Parent-report**: significant main effect of time, significant group x time interaction, Cohen's D = 1.17[1] **Self-report**: marginally significant group x time interaction, Cohen's d = .51[1] **Follow up** - 36% of participants demonstrated a remission in clinically significant anxiety symptoms[2]

Storch, Arnold, Lewin, Nadeau, Jones, De Nadai, Mutch, Selles, Ung & Murphy (2013)	RCT Intervention Vs Treatment As Usual Control Pre and Post Testing. Follow up (3 months post-intervention) Single blind (Clinicians)	**Characteristics** Diagnosed with ASD (29%), Asperger's Syndrome (40%) or PDD-NOS (31%) and at least one primary anxiety disorder (Separation Anxiety Disorder, Generalised Anxiety Disorder, Obsessive compulsive disorder or Social Phobia). IQ>70. 84% Caucasian. **N (% male):** 45 (80%) **Age Range:** 7 - 11 years. **Mean Age:** 8.89 years	**Experimental Group (n = 24):** Psychologist led manualized, family-based CBT programme according to the Behavioural Interventions for Anxiety in Children with Autism (BIACO). <u>Programme:</u> 16 x 90 minute weekly sessions, child and parent involvement, homework assignments. Clinic setting. **Control Group (n = 21):** Treatment As Usual - Psychosocial and/or pharmacological treatment continued/ initiated as planned.	Anxiety: Clinician-Report: ADIS-C/P PARS CGI - Severity CGI - Improvement Parent-Report: CBCL MASC-P Child-Report RCMAS Secondary Measures: CIS-P (Impairment scale) SRS	**Clinician-report:** Large treatment effects for the PARS (d = 1.03). Large group differences in favour of the CBT observed for CGI-Severity and ADIS-C/P (d = 1.59)[1]. **Parent-report:** No group differences observed for MASC-P. Greater reductions on internalising behaviour[3] **Self-report:** Group difference in anxious arousal only[3] **Additional Measures:** Group differences on SRS (Medium). **Follow up -** no significant changes from post-treatment were observed (75% of CBT responders

					maintained treatment gains).
White, Ollendick, Albano, Oswald, Johnson, Southam-Gerow, Kim & Scahill (2013)	RCT (block randomisation) Intervention Vs Wait-list Control. Pre and Post Testing. Single blind (Clinician)	**Characteristics** Diagnosed with ASD (33%), Aspergers (53%) or PDD-NOS (13%) - supported by the ADOS and ADI-R and at least one primary anxiety disorder (Separation Anxiety Disorder, Generalised Anxiety Disorder, Specific Phobia or Social Phobia). IQ≥70. 87% Caucasian. **N (% male):** 30 (77%) **Age Range:** 12 - 17 years. **Mean Age:** 175 months (15 years)	**Experimental Group (n = 15):** Psychologist led manual-based modular treatment CBT programme (MASSI) Programme:14 week intervention, 75 minute sessions, simultaneous group (7 sessions of skills practice) and individual treatment (up to 13 sessions), plus parent education and coaching after each session. Clinic based. **Control Group (n = 15):** 14 week wait-list (curriculum as usual).	Anxiety: Clinician-Report: PARS CGI-I **Parent-Report:** Child and Adolescent Symptom Inventory-4 ASD Anxiety Scale (CASI-Anx) **Secondary Measures:** SRS - Parent DD-GAS (Global assessment scale)	**Clinician-report:** No statistically significant within or between group change for PARS. **Parent-report:** No statistically significant within or between group change for CASI-Anx. Four participants in intervention group demonstrated reliable and clinically significant change. **Secondary Measures:** Significant improvements in social skills (d = 1.18) and overall functioning (d = 0.81) for the intervention group

					from pre to post treatment [13]
Reaven, Blakeley-Smith, Culhane-Shelburne & Hepburn (2012)	RCT Intervention Vs Treatment As Usual Control Pre and post testing Single blind (Independent evaluators)	**Characteristics:** Diagnosed with ASD (62%), Aspergers (32%) or PDD-NOS (6%) and clinically significant symptoms of anxiety (Separation, Social and/or Generalised). IQ≥70. 84% Caucasian. **N (% male):** 50 (96%) **Age Range:** 7 - 14 years **Mean Age:** EG: 125.75 Months CG: 125.00 months	**Experimental Group (n = 24):** Psychologist led 'Facing Your Fears' CBT intervention. Programme: 12 x 90 minute multi-family group sessions (3-6 children and parents). Large group activities, small group activities and dyadic work. Clinic based. **Control Group (n = 26):** Maintained current intervention programmes and allowed to pursue new programmes.	Anxiety: Clinician-Report: ADIS-C/P CGI-I Parent-Report: SCARED Child-Report: SCARED	**Clinician-report:** Children in the intervention condition demonstrated significant reduction in overall number of anxiety disorders, TAU condition did not. Specific reduction in GAD (d = .85). CGIS-I - 50% of children in intervention group demonstrated positive treatment response, compared to 9% in TAU group[5] **Parent- and child-report:** Significant post-intervention reductions maintained at both 3 and 6 month follow

					up[2]
Sung, Ooi, Goh, Pathy, Fung, Ang, Chua & Lam (2011)	RCT Intervention Group Vs Active Control Group Pre and post testing. Follow ups (3 and 6 month after intervention) Single blind (Clinician)	**Characteristics:** Clinical diagnosis of Autism/ PDD-NOS 83% or Asperger's Syndrome 17% and anxiety-related issues (recruited through a clinic). Verbal Comprehension ≥ 80. 93% Chinese. **N(% male):** 70 (94%) **Age Range:** 9 - 16 years **Mean Age:** EG = 11.33 CG = 11.09	**Experimental Group (n = 36):** Trained therapist led manualized Group CBT program (modified from various existing CBT programmes and adapted to suit ASD sample). Programme: 16 x 90 min weekly sessions (3-4 per group), homework assignments. **Control Group (n = 24):** Active - Trained therapist led manualized group Social Recreational program. Programme: 16 x 90 min weekly sessions (3-4 per group)	Anxiety Clinician-Report: CGI-S Self-Report: SCAS-C	**Clinician-report:** Percentage of participants in the 'normal' range increased between time 1& 4. No significant difference between groups at different time points. Reliable change index - 18.75% in intervention group, 16.13% in control group. No significant differences between two groups. **Self-report:** Both groups reported significantly fewer generalised anxiety and total anxiety symptoms. No difference between

					groups over time.
Reaven, Blakeley-Smith, Nichols, Dasari, Flanigan & Hepburn (2009)	RCT Intervention Vs Wait-list Control. Pre and Post testing.	**Characteristics:** Diagnosis of ASD - Autistic Disorder (45%), PDD-NOS (3%), Aspergers Syndrome (42%) and significant Anxiety Symptoms (Parent reports/ questionnaire cut-offs). IQ ≥ 70. 81% Caucasian. **N (% Male):** 33 (79%). **Age Range:** 7-14 years **Mean Age:** 11.8 years	**Experimental Group (n = 10):** Psychologist led family-based CBT intervention. Participants assigned to age cohort. Programme: 12 x 90 min weekly sessions including large group time, separate parent and child group meetings and parent-child dyads. **Control Group (n =23):** 12 week wait-list (standard curriculum)	Anxiety: Parent-Report: SCARED Self-Report: SCARED	**Parent-report**: Significant decrease in the severity of anxiety symptoms over time in the treatment group compared to the wait list group[13] **Child-report**: No significant time, group or intervention effects.
Wood, Drahota, Sze, Har, Chiu & Langer (2009)	RCT Intervention Vs Wait-list Control.	**Characteristics:** Met research criteria for a diagnosis of ASD (50%),	**Experimental Group (n = 17):** Therapist led 'Building Confidence' CBT programme.	Anxiety: Clinician-Report: ADIS-C/P CGI-I	Clinician-report: 92.9% in intervention group met criteria for

	Pre and Post testing. Follow-up (3 months). Single blind (Independent evaluators)	Asperger Syndrome (42%) or PDD-NOS (8%) and an anxiety disorder (SAD, SP or OCD). No current therapeutic interventions. IQ > 70. 48% Caucasian. Lived in Western USA. **N (% Male)** 40 (68%) **Age Range:** 7-11 years **Mean Age:** 9.20 years	<u>Programme:</u> 16 x 90 minute weekly sessions (30 minutes with child, 60 minutes with the parents/ family). Clinic based. **Control Group (n = 23):** Wait-list (standard curriculum).	Parent-Report: MASC-P Self-Report: MASC-C	positive treatment response, compared to 9.1% of WL control[5]. 64% of treatment completers did not meet criteria for anxiety disorder at post treatment. Post treatment/ wait-list CSR scores lower in the IT group than in the WL group[5]. **Parent-report:** Statistically significant difference between the IT and WL groups at post treatment[1]. **Child report**: No significant effects reported.
Chalfant, Rapee & Carroll (2007)	RCT Intervention Vs Wait-list Control. Pre & post testing	**Characteristics:** ASD diagnosis: 13 High-functioning ASD (27.7%) and 34 Asperger's Syndrome	**Experimental Group (n = 28):** Psychologist- led Group CBT intervention: Adaptation to 'Cool Kids' program.	Clinician-Report: ADIS-C/P Parent-Report: SCAS-P	**Clinician-report:** Significant reduction in the number of anxiety disorders in the EG compared to the

	Open Trial	(72.3%) and primary Anxiety Disorder (Separation Anxiety Disorder n = 8, Generalised anxiety disorder n = 14, Social Phobia n = 20, Specific Phobia n = 3, Panic Disorder n = 2). **N (% male):** 47 (74%) **Age range:** 8 - 13 years **Mean age:** 10.8 years	Programme: 9 x 120 min weekly sessions, 3 x 120 min monthly booster sessions, concurrent parent sessions. **Control Group (n = 19):** Three month wait-list - curriculum as usual.	SDQ- parent Self-Report: RCMAS SCAS CATS Teacher-Report SDQ- teacher	CG[5]. **Self-report:** Greater reduction in self-reported anxiety and internalising thoughts for EG compared to CG[5]. **Parent-report:** Greater reduction in anxiety symptoms and emotional difficulties for EG compared to CG[5]. **Teacher-report:** Greater reduction in anxiety symptoms and emotional difficulties for EG compared to CG[5].
Sofronoff, Attwood & Hinton (2005)	RCT 3 Treatment Conditions: Intervention for child only (1),	**Characteristics:** Primary diagnosis of Asperger's Syndrome and presence of anxiety. Comorbid ADHD (42%) or	**Experimental Group 1 (n = 23):** Psychologist led group CBT intervention, 'Exploring feelings'. Programme: 6 x 120min weekly sessions, 3 children + 2 therapists	Anxiety: Parent-report: SCAS-P SWQ **Self-report:** SCAS (pre-	**Parent-report:** Significant main effect for time and time x group interaction[13]. EG 2 (combined parent + child intervention)

	Intervention for child and parent (2), Wait-list control (3). Pre and Post testing. Follow up (six weeks after intervention).	Depression (8%). Participants with significant language delay excluded. **N (% male):** 71 (87%) **Age range:** 10 - 12 years **Mean age:** EG 1:10.56 EG 2:10.54 Wait-list:10.75	per group. **Experimental Group 2 (n = 25):** Psychologist led group CBT intervention, 'Exploring Feelings' with parents. Programme: 6 x 120min weekly sessions, 3 children + 2 therapists, parent groups alongside. **Control Group (n = 23):** Treatment as usual.	assessment only) 'James and the Maths Test' - strategies generated by children	showed greatest improvement between time 1 & 3. **Self-report:** Significant difference between each of the intervention groups and the wait-list group at time 2[5]. EG 2 (combined parent + child intervention) showed greatest improvement. **Follow-up:** Change maintained at follow-up or further change identified.

NOTE: ADIS-C: Anxiety Disorders Interview Schedule for Children; **ADIS-P:** Anxiety Disorders Interview Schedule for parents; **BASC:** Behavioural Assessment System for Children**; CATS:** Children's Automatic Thoughts Scale; **CBCL:** Child Behaviour Checklist; **CGI-I:** Clinical Global Impression - Improvement, **CGI-S:** Clinical Global Impression - Severity**; CIS-P:** Columbia Impairment Scale - Parent version; **CSR**: Clinical Severity Rating; **DD-GAS:** The Developmental Disabilities Children's Global Assessment Scale; **MASC:** Multidimensional Anxiety Scale for Children; **MASC-P:** Multidimensional Anxiety Scale for Children - Parent version; **PARS:** Paediatric Anxiety Rating Scale; **RCMAS:** Revised Children's Manifest Anxiety Scale**; SCARED:** Screen for Child Anxiety Related Emotional Disorders; **SCAS:** Spence Children's Anxiety Scale; **SDQ:** Strengths and Difficulties Questionnaire; SACA Interview: Services Assessment for Children and Adolescence; **SRS:** Social Responsiveness Scale.

1 Significant difference between groups in change scores from pre to post intervention (i.e., an interaction between group and time that favours the experimental group)

2 Significant difference between groups in change scores from post intervention to follow-up (i.e., an interaction between group and time that favours the experimental group)

3 Significant within-group improvement at post (vs. pre) intervention

4 Significant within-group improvement at follow-up (vs. pre) intervention

5 Significant between-group differences at post-test that favours the experimental group

6 Significant between-group differences at follow up that favours the experimental group

7 Significant within-group improvement at follow-up (vs. post) intervention

Appendix C

Included Papers Data Extraction Studies investigating interventions aimed at addressing Social Skill Deficits

Study Reference	Study Design	Target Sample	Intervention	Outcome Measures	Key Results
Koning, Magill-Evans, Volden & Dick (2013)	RCT (stratified based upon receptive language levels) Intervention Vs Wait-list Control. Pre and Post testing. Single blind (observations)	**Characteristics:** Clinical diagnosis of ASD confirmed by the ADOS, receptive language and non-verbal IQ >80. **N (% Male):** 15 (100%) **Age Range:** 10 - 12 years **Mean Age:** 11.07 years	**Experimental Group (n = 7):** Manualized CBT social skills group programme - adapted from a combination of several programmes. Programme: 15 x weekly 120 min sessions. Groups led by 2 trained leaders. **Control Group (n = 8):** Wait-list (curriculum as usual)	**Clinician Report** Peer Interaction Measure Parent Report VABS-Socialisation scale. SRS Child Report CASP Social Knowledge Test	**Clinician Report** Significant group x time interaction effect for the Peer Interaction Measure total score[1] (ES large). **Parent Report** No significant interaction effects for parent ratings. **Child Report** Significant group x time interaction effect for CASP scores[1] (ES large) Significant group x time interaction effect for the social knowledge test[1] (ES large)
Kasari, Rotheram-Fuller, Locke &	RCT (block randomisation by	**Characteristics:** Met criteria for ASD on	**Experimental Group 1 (n = 15):** Child-assisted intervention - session	**Direct Observation:** Playground	**Direct Observation** Faster decline in solitary

Gulsrud (2012)	class and stratified by age) 2 x 2 factorial design: 3 x active treatment groups, 1 x control group. Pre and Post Testing. Follow-up (3 months after intervention) Single blind (clinicians)	the ADI-R and ADOS, fully included in mainstream education for >80% of school day, IQ >65, no additional diagnoses. **N (% Male):** 60 (90%) **Age Range:** 6-11 years **Mean Age:** 8.14 years.	with trained interventionist 12 x 20 min, twice weekly. Didactic instruction, role playing and practice of targeted skills. **Experimental Group 2 (n = 15):** Peer-mediated intervention - typically developing children form target child's class taught strategies for engaging child. 12 x 20min group sessions, twice weekly. **Experimental Group 3 (n = 15):** Both Peer and Child interventions. **Control Group (n = 15):** Wait-list (curriculum as usual)	observation of peer engagement (timed interval behaviour coding system). **Child Report:** Social Network Survey - student's level of involvement in the classroom's social networks. Teacher Report: TPSS	engagement for EG2[5] C**hild Report** Significant group effect on SNS scores[3], with a main effect of intervention[5] and interaction effect[1].SNS increased for groups with a peer mediated component compared to those without. Children in EG3 had significantly higher SNS scores (ES = 1.12). Effects maintained at follow-up. **Teacher-Report** Significant main effect of Peer[5] * Peer-mediated treatments were superior to non-peer mediated treatments on several outcomes and these treatment gains were maintained at follow-up.

Laugeson, Frankel, Gantman, Dillon & Mogil (2012)	CT (block assignment) Intervention Vs Wait-list Control. Pre and Post Testing. Follow up (14 weeks after intervention completion). Single blind (Teachers)	**Characteristics:** Middle and high school adolescents with a previous diagnosis of HFA (14), Asperger's Disorder (13) or PDD-NOS (1). 57% in a regular school setting, 21% in special education, 22% in non-public schools. **N (% Male:)** 28 (82%) **Age Range:** 12 - 17 **Mean Age:** 14.6 years	**Experimental Group (n = 14):** The PEERS Program, parent-assisted social skills group, delivered by clinical psychologists. (Extension of the CFT). Based upon Psycho-educational and CBT framework. <u>Programme:</u> 14 x weekly 90 min group sessions, 8-10 adolescents per group. Concurrent parent groups. Weekly homework assignments. **Control Group (n = 14):** Wait-list (curriculum as usual)	Parent Report: SSRS SRS QPQ Child Report: QPQ TASSK-R Teacher Report: SSRS SRS	Parent Report Parents in the EG reported significant improvement in overall social skills, greater reduction in ASD symptoms relating to social responsiveness and an increase in hosted get-togethers on the QPQ in comparison to CG[1]. **Child Report** Significant improvements in knowledge of social skills in the treatment group versus the CG[5]. **Teacher Report** Limited Teacher data indicates significant improvement in overall social skills for treatment group only[5]. **Follow-up** - treatment gains largely maintained

					for treatment group.
Lerner & Mikami (2012)	RCT Intervention Vs Active Control. Pre and Post testing. Single Blind (Clinician and Parent) School-based intervention.	**Characteristics:** Previous HFASD diagnosis, compared with clinical cut-offs on the SCQ and SRS. Asperger's Syndrome (n = 9), Autism (n = 2), PDD-NOS (n = 2). **N (% Male):** 13 (100%) **Age Range:** Not specified **Mean Age:** EG1: 10.86 years EG2: 11.33 years	**Experimental Group 1 (n = 7):** Manualized performance based intervention: Sociodramatic Affective Relational Group Intervention (SDARI) **Experimental Group 2 (n = 6):** Manualized brief knowledge based intervention: Skillstreaming Group social skill intervention. <u>Programmes:</u> 4 x 90min weekly after-school sessions**.** 10 minute free-play break in the middle of each session**.**	**Clinician Report:** Social Interaction Observation System (SIOS) Parent Report: SRS SSRS-P Parent Satisfaction Survey **Child Report:** Socio-metric Nominations. Teacher Report: SSRS-T .	**Clinician Report** EG1 decreased in negative interactions over time relative to EG2[1] **Parent Report** No significant effects reported for parent-reported social skills. **Child Report** Significant effect of time for social prefernce[3] - both groups increased in social preference. Also a Group x Time interaction for social preference[1] - EG1 decreased over time, EG2 increased sharply (ES = .37 & .70). Significant effect of time for reciprocal friendship nominations[3] - both groups increased in

					social preference. **Teacher Report** Significant effect of time, both groups increased (ES = .59)
Thomeer, Lopata, Volker, Toomey, Lee, Smerbeck, Rodgers, McDonald & Smith (2012)	RCT (stratified into age groups) Intervention Vs Wait-list Control. Pre and post testing. Parent follow-up ratings 2-3 months post treatment. Treatment completed on college campus.	**Characteristics:** Clinical diagnosis of HFASD, confirmed by the ADI-R. (Asperger's Syndrome n = 25, PDD-NOS n = 9, HFA = 1) Caucasian 80% IQ>70, Verbal IQ> 80 **N (% Male):** 35 (85.7%) **Age Range:** 7 - 12 years **Mean Age:** 9.31 years	**Experimental Group (n = 17):** psychosocial social skills intervention. <u>Programme:</u> 5 x 70 min group treatment cycle per day for 5 weeks. 6 children per group and 3 staff (students). Skill instruction and a therapeutic cooperative activity. Response-cost behavioural reward system implemented. + 90 min, weekly parent training groups. **Control Group (n = 18):** Wait-list (Curriculum as usual)	**Parent Report:** Adapted skillstreaming checklist SRS BASC-2-PRS - withdrawal subscale and social skills subscale **Child Report:** Skillstreaming Knowledge Assessment DANVA2 Comprehensive Assessment of Spoken Language **Teacher Report*:** BASC-TRS - withdrawal subscale and social skills	Parent Report Significant main effect of group for the ASC, SRS and BASC Social Skills Subscale (ES = .85, .67 & . 70 respectively), favouring the treatment group[5]. **Child Report** Significantly higher post treatment scores for the treatment group on measures of knowledge of target social skills and understanding of idioms[5]. Non-significant improvement of facial-emotion recognition. **Teacher Report** Significant Group x Time interaction for SRS

				subscale SRS *for treatment group only. Parent, Child and Staff Satisfaction Surveys	and BASC social skills[1] (ES = .47, .68) **Follow-up:** Treatment gains maintained at follow-up for use of targeted and broader social skills.
Castorina & Negri (2011)	RCT Intervention Vs Active Control Vs Wait-list Control. Pre and Post testing. Follow up (3 months post intervention) Single blind (Teachers) Conducted within clinic setting.	**Characteristics:** Clinical diagnosis of Asperger's Syndrome. Attending mainstream primary school. Girls excluded. **N (% Male):** 21 (100%) **Age Range:** 8.42 years - 11.92 years **Mean Age:** 10.30 years (s.d 1.15)	**Experimental Group 1 (n = 7):** Sibling participation. Therapist led group Social skills training package. <u>Programme:</u> 8 x 120 minute weekly sessions. Therapist and co-therapist. Homework. **Experimental Group 2 (n = 8):** No sibling participation. Therapist led group Social skills training package. Homework. <u>Programme:</u> 8 x 120 minute weekly sessions. Therapist and co-therapist. **Control Group (n = 6):** Wait-list (curriculum as usual).	Parent Report: SSRS-P Child Report: CASP Teacher Report: SSRS-T	**Parent-report:** Significant main effect of time[3] No significant main effect of group or group x time interaction. **Child Report:** Main effects of Group[5] and Time[3] Improved social perception for experimental group 1 and 2 in comparison to wait-list control group. No significant time x group interaction. Sibling inclusion did not enhance generalisation and maintenance of treatment effects. **Teacher-report:**

					No significant main effects or interaction.
DeRosier, Swick, Davis, McMillen & Matthews (2011)	RCT Intervention Vs Active Control. Pre and Post Testing.	**Characteristics:** Prior diagnosis of HFASD - 42% HFASD, 38% Asperger's Syndrome, 16% PDD-NOS. Diagnosis confirmed through SCQ, ASSQ and CAST. IQ >85 **N (% Male):** 55 (96%) **Age Range:** 8 - 12 years **Mean Age:** EG: 10.2 years CG: 9.88 years	**Experimental Group (n = 27):** Manualized and modular Social Skills Group Intervention -High Functioning Autism (SSGI -HFA, adapted to meet needs of ASD participants). Cognitive-behavioural and Social Learning techniques. Didactic instruction combined with active practice. Programme: 15 x 60 min group weekly sessions. Four parent-child conjoint sessions. 1 group leader, 1 co-leader. **Control Group (n = 28):** Active - traditional Social Skills Group Intervention (SSGI). Programme: 10 x 60 min group weekly sessions. No parent involvement. 1 group leader, 1 co-leader.	**Parent Report:** SRS Achieved Learning Questionnaire (ALQ) Social Self-Efficacy Scale **Child Report:** Social Dissatisfaction Questionnaire. Social Self-Efficacy Scale.	**Parent Report** Parent reports yielded a significant main effect for treatment condition[5]. Parents in the EG reported a significant improvement in children's social skills, parents in the CG reported a decline in children's social skills. **Child Report** No significant main effect for treatment condition for the child self-reports.
Hopkins, Gower,	RCT	**Characteristics:**	**Experimental Group (n = 24):**	**Direct Observation:**	**Direct Observation:**

Perez, Smith, Amthor, Wimsatt & Biasini (2011)	Intervention Vs Active Control. (stratified into two groups - High Functioning and Low Functioning) Pre and Post Testing. Single Blind (Observers) Interventions completed at school or an after-school facility.	Previous diagnosis of ASD by a licensed community professional, confirmed by administration of the CARS. **N (% Male):** 49 (90%) **Age Range:** 6 - 15 years **Mean Age:** 10.17 years	Computer-based training programme using 'FaceSay' software - avatar assistant programme designed to teach social skills. <u>Programme:</u> 12 x 10-25 minutes sessions twice a week at school with the assistance of one investigator. Game-based programme. **Control Group (n = 25):** 'Tux Paint', open source drawing software at the school. 12 x 10-25 min sessions twice a week.	Social Skills Observation (by research assistant). Parent Report: SSRS **Child Report:** Emotion Recognition - photographs and schematic drawings used to measure ability to recognise emotional expression through matching emotion label to picture. Facial Recognition: Benton Facial Recognition Test (Short Form).	Significant change in total scores on the Social Skills Observation for the HFA and LFA intervention groups[1]. **Parent Report** Significant change in the SRRS scores for the LFA and HFA intervention groups compared to the control group[1]. **Child Report** Significant difference in total emotion recognition skills for both the LFA and HFA intervention groups[5]. Significant difference in facial recognition skills for the HFA intervention group[5].
Lerner, Mikami & Levine (2011)	CT (no randomisation) Intervention Vs	**Characteristics:** Diagnosis of Asperger's Syndrome (65%) or High Functioning	**Experimental Group (n = 9)*:*** Socio-dramatic affective-relational intervention (SDARI). Group based, manualized social skills intervention,	Parent Report: CBCL SSRS EDI SRS	**Parent Report** Significant main effect of time for CBCL, EDI, SRRS[3], no main effect

	Treatment-As-Usual Control. Testing at 7 time points (pre intervention and at 3 weekly intervals).	Autism (35%), confirmed via pre-existing diagnostic report and the Social Responsiveness Scale. **N (% Male):** 17 (82%) **Age Range:** 11- 17 years **Mean Age:** EG - 14.31 years CG - 14.32 years	game-based instructional method. Programme: 'Spotlight Summer Programme', 29 x 5 hour sessions, daily for 6 weeks. 7 groups in total (5-9 youth, 3 staff per group). 1-3 participants per group. **Control Group (n = 8):** Attending an affiliated clinic. Treatment as usual.	Satisfaction Survey Child Report: DANVA-2 BDI-Y	of group or group x time interactions (no differences between EG and CG) **Child Report** Significant main effect of time for DANVA-2 only[3], no significant group or time x group interaction (no differences between EG and CG)
Frankel, Myatt, Sugar, Whitham, Gorospe & Laugeson (2010)	RCT Intervention Vs Wait-list Control. Pre and Post testing. Follow up (3 months following	**Characteristics** ASD diagnosis confirmed by ADOS and ADI-R, 61 in mainstream schools, 6 in special education classes. Verbal IQ >60. 66% Caucasian.	**Experimental Group (n = 35):** Children's Friendship Training (CFT), manualized, parent-assisted intervention to improve social skills. Programme: 12 x weekly 60 min sessions. 4 ASD children in a group of 10 in total (with 6 non-ASD children seeking clinical treatment). Concurrent parent sessions.	Parent ratings: QPQ SSRS Child-Report: The Loneliness Scale Piers-Harris Self-Concept Scale (PHS) Teacher Outcome Measures: The Pupil Evaluation	**Child ratings:** Children in EG reported significant improvements on loneliness scale, popularity subscales when compared with children in CG[1] **Parent Ratings:**

	intervention) Open-trial	**N (% Male):** 68 (85.7%) **Age Range:** 2nd - 5th grade classroom **Mean Age:** EG = 103.2 months DTC = 101.5 months	Socialisation homework assignments. **Control Group (n = 33):** Wait-list treatment received after 12 month delay.	Inventory (PEI)	Statistically significant increases in number of hosted play dates and decreased disengagement on play dates in comparison to the CG[3]**.** Parents of EG reported significantly improved self-control and assertion compared to the CG[3] Teacher Ratings:No significant findings. **Follow-up:** Gains not maintained for child or teacher ratings. Parent-report improvements maintained.
Koenig, White, Pachler, Lau, Lewis, Klin & Scahill (2010)	RCT Intervention Vs Wait-list Control. Pre and Post Testing	**Characteristics:** Clinical diagnosis of PDD confirmed through the ADOS, SCQ and PDD-BI. Autism (n = 10), Asperger's Disorder (n = 9), PDD-	**Experimental Group (n = 25):** 16 week manualized social skills group. Based on social learning theory and principles of behaviour theory. <u>Programme:</u> 16 x 75 min weekly group sessions. 4/5 participants, 2	Clinician-Report: CGI-I **Parent-Report:** Social Competence Inventory (SCI) Parent Satisfaction Survey	**Clinician-report:** Rate of response for the treatment group was significantly greater than response in the wait-list group (70% of treatment group rated as

	Single blind (clinician)	NOS (n = 23). IQ> 70. 98% Caucasian. **N (% Male):** 44 (77%) **Age Range:** 8-11 years **Mean Age:** EG 9.2 years WL 9.3 years	peer tutors and 2 clinicians per group. **Control Group (n = 19):** Wait-list - curriculum as usual.		responders, 0% of control group). **Parent-report:** Significant main effect of time[3] No significant main effect of group or group x time interaction.
Lopata, Thomeer, Volker, Toomey, Nida, Lee, Smerbeck & Rodgers (2010)	Quasi-experimental (stratified on age, gender and ethnicity) Intervention Vs Wait-list Control. Pre and Post Testing.	**Characteristics:** Written diagnosis of High Functioning ASD, researcher reviewed. 77.8% Asperger's Syndrome, 19.4% PDD-NOS, 2.8% HFA. IQ > 70. 88.9% Caucasian. **N (% Male):** 36 (94.4%)	**Experimental Group (n = 18):** Combined social skills and behaviour treatment summer programme. based upon manualized Skillstreaming programme. Social skill instruction and therapeutic activity. Inclusion of behaviour management point system with response cost. Parent weekly training groups (5 x 90 min session). <u>Programme</u>: 6 hour daily sessions X	Parent Report: ASC SRS BASC-PRS - withdrawal and social skills scales. **Child Report:** Skillstreaming Knowledge Assessment (SKA) DANVA2 Teacher-Report: ASC	**Parent Report:** Significant group x time interaction for the ASC, SRS and the BASC withdrawal scale[1] (ES - medium and large) **Child Report:** Significant between group differences for the SKA and DANVA2 idioms subscale[5] , favouring the

	Open Trial Intervention conducted on college campus.	**Age Range:** 7 - 12 years **Mean Age:** 9.47 years	5 (each week for 5 weeks). Daily schedule consisted of 5 x 70min treatment cycle. 6 children with HFASD per group, 3 staff. **Control Group (n = 18):** Wait-list (curriculum as usual)	SRS BASC-TRS - withdrawal and social skills scales. Parent, child and staff satisfaction surveys.	intervention group (large and small ES respectively). **Teacher Report:** Significant main effect of time for the ASC, SRS and BASC[3] (all in expected directions).
Cotugno (2009)	Quasi-experimental design (matched) Intervention group (stratified by age) Vs Matched non-ASD control group. Pre and post testing	**Characteristics:** Prior diagnosis of ASD confirmed by neuropsychological evaluation, verbal and full IQ in average range (80-119), at least one partial inclusion program in regular curriculum. Control group - randomly selected from mainstream schools. **N (% Male):** EG: 18, Not Specified	**Experimental group (n = 18):** Therapist led group Social skills training package. Peer-based, group model within CBT and skills teaching framework. Homework. Anxiety management included. Programme: 8 x 120 minute weekly sessions. Therapist and co-therapist. Two clusters of age: 7-8 and 10-11. **Control Group (n = 6):** Wait-list (curriculum as usual).	**Parent Report:** MGH YouthCare Social Competency/ Social Skills Development Scale (SCDS) - measures cognitive aspects (stress/ anxiety, attention, flexibility), social interpersonal skills and self-awareness. **Teacher Report:** Walker-McConnell Scale of Social Competence and Social Adjustment	**Parent Report:** Significant pre-post improvements in parent ratings of stress and anxiety management, joint attention and flexibility[1]. **Teacher Report:** Significant pre-post improvements across the three scales and total score for the intervention groups in comparison to the control group[1]. No significant change in scores for comparison control group.

		CG: 10, Not Specified **Age Range:** 7 - 11 years **Mean Age:** Not specified.		(WMS) - measures teacher-preferred and peer-preferred social behaviour and school adjustment behaviour.	
Laugeson, Frankel, Mogil & Dillon (2009)	RCT Intervention Vs Wait-list Control. Pre and Post Testing. Single blind (Teachers)	**Characteristics:** Adolescents with a previous diagnosis of HFA (23), Asperger's Disorder (9) or PDD-NOS (1). 17 in a regular school setting, 8 in special education, 5 in non-public schools and 3 home-school. 42% Caucasian. **N (% Male:)** 33 (88.2%) **Age Range:** 13 - 17	**Experimental Group (n = 17):** The PEERS Program, parent-assisted social skills group, delivered by clinical psychologists. (Extension of the CFT). Based upon Psycho-educational and CBT framework. <u>Programme:</u> 12 x weekly 90 min group sessions, < 7 adolescents per group. Concurrent parent groups. Weekly homework assignments. **Control Group (n = 16):** Wait-list (treatment after 12 week wait period).	Parent-Report: SSRS QPP Child-Report: QPQ TASSK-R Friendship Qualities Scale Teacher-Report: SSRS	**Parent and Self report:** Group x Time effect for combined pupil (TASSK-R, QPQ Host, FQS) and parent (SSRS) outcome variables. Treatment group significantly improved on these outcome measures in comparison to the delayed treatment control group[1]. **Teacher-report:** No significant Group x Time effect for Teacher outcome variables.

		Mean Age: 14.6 years			
Beaumont & Sofronoff (2008)	RCT Intervention Vs Wait-list Control. Pre and Post testing. Follow up (6 weeks and 5 months post intervention) Open Trial. Conducted at the University.	**Characteristics:** Asperger Syndrome diagnosis confirmed by a paediatrician and a screening test. IQ $\geq$ 85. **N (% Male):** 49 (90%) **Age Range:** 7.5 -11 years **Mean Age:** EG:9.64 years CG:9.81 years	**Experimental Group (n = 26):** Multi-modal Social Skills programme, 'The Junior Detective Training Program'. Programme: 7 x 120min weekly sessions, including a computer programme, small group therapy and parent training sessions. 1 x 6 week follow up session. Teacher handouts **Control Group (n = 23):** Wait-list (curriculum as usual).	**Parent-Report:** Social Skills Questionnaire Emotion Regulation and Social Skills Questionnaire (ERSSQ) **Child-Report:** Assessment of Perception of Emotion from Facial Expression. Assessment of Perception of Emotion from Posture Cues. 'James and the Maths Test' and 'Dylan is Being Teased' (Identification of anxiety strategies)	**Parent-report:** Significant main effect of group[5], time[3] and interaction between group and time[1]. Treatment participants made greater improvements on the parent report social skills measures than wait-list controls. **Child-report:** Emotion Recognition - Significant main effect of time[3] (ES = .31), indicating improvements in both groups. No significant main effect of group or group x time interaction. Emotion management strategies -Significant

				Teacher-Report: Social Skills Questionnaire	main effect of group[5], time[3] and interaction between group and time[1]. **Teacher-report:** High attrition. Significant main effect of time[3] (ES = .68), with significant improvements between T2 - T3, not T1 - T2. **Follow-up:** Improvements in social functioning for both groups were maintained at 6-week and 5-month follow up.
Lopata, Thomeer, Volker, Nida & Lee (2008)	Quasi-experimental design (age, gender and diagnosis matched pairs) Intervention Vs Active Control.	**Characteristics:** Diagnosis of Autism Disorder (66.7%), HFA (11.1%) or PDD-NOS (22.2%), (written documentation of formal diagnosis and review of diagnosis). IQ >70, absence of	**Experimental Group 1 (n = 25):** Combined social skills and behaviour treatment summer programme. based upon manualized Skillstreaming programme. Social skill instruction and therapeutic activity. Inclusion of behaviour management point system with response cost.	**Parent-Report:** BASC-PRS - social skills, adaptability and atypicality subscales Skillstreaming Survey (Ss) Parent Satisfaction Survey. **Teacher-Report:**	**Parent- and Teacher-report:** <u>BASC -</u> Social skill scale - significant main effect of time[3], no interaction effects. Adaptability scale - significant main effect of

	Pre and Post testing. Open Trial. Data collection over two years.	significant language delay. 88.9% Caucasian. **N (% Male):** 54 (92.6%) **Age Range:** 6-13 years **Mean Age:** EG1: 9.41 years EG2: 9.6 years	Programme: 6 hour daily sessions X 5(each week for 6 weeks). Daily schedule consisted of 4 x 70min treatment cycle. **Experimental Group 2 (n = 29):** Social skills summer treatment programme - based upon manualized Skillstreaming programme. Social skill instruction and therapeutic activity. Naturalistic feedback. Programme: 6 hour daily sessions X 5(each week for 6 weeks). Daily schedule consisted of 4 x 70min treatment cycle. 4-6 children per group, 3 staff.	BASC-TRS - social skills, adaptability and atypicality subscales Skillstreaming Survey (Ss) Child-Report: DANVA2	time[3], no interaction effects. Atypicality scale - no significant interaction or main effect for parent-report, significant time x group interaction for teacher-report[1] Ss - Significant increases between pre and post scores[3] and medium effect sizes (d = .54), no significant time x group interactions found. **Child-report:** No significant main effect of time or interaction effects.
Owens, Granader, Humphrey & Baron-Cohen (2008)	Quasi-experimental design Intervention Vs Active Control Vs Wait-list Control.	**Characteristics:** Diagnosis of ASD by a psychologist, paediatrician or psychiatrist (High Functioning Autism n = 8, Aspergers Syndrome n = 27, ASD n = 8,	**Experimental Group 1 (n = 16):** LEGO Therapy. Programme: 18 x 60min weekly group sessions, group project work, diving tasks into different roles. **Experimental Group 2 (n = 15):**	**Clinician Report:** VABS - socialisation, communication and maladaptive behaviour domains. **Direct Observations:** (Intervention groups only) - frequency of	**Clinician report:** Maladaptive behaviour - EG1 significant improvement[5]. Communication - EG2 significant improvement[5]. Socialisation - EG2

	Pairwise matching (treatment group) Opportunity control group. Pre and post testing. Single blind (Clinicians)	Autism n = 4). IQ>70, attending mainstream school (or an inclusion unit within), no additional diagnoses of psychiatric disorders. **N (% Male):** 47 (98%) **Age Range:** 6 - 11 years **Mean Age:** EG1: 99.13 (mths) EG2: 97.33 (mths) CG: 105.81 (mths)	The Social Use of Language Programme (SULP) - direct teaching approach. <u>Programme:</u> 18 x 60 min weekly sessions. Stories, group activities and games. Social and communication skills teaching. **Control Group (n = 16**): recruited through another study.	self-initiated social contact with peers and duration of social interaction with peers. **Parent-Report:** GARS - Social Interaction Subscale Parent Satisfaction Questionnaire.	significant improvement[5]. **Direct Observations:** Lego Group significant increase in duration of social interactions in comparison to EG2 and wait-list. **Parent-report** Significant difference between groups post-intervention, Lego-group significantly improved in comparison to EG2 and wait-list[5]. Within-group analysis indicates no significant increases or decreases for any of groups.
Kroeger, Schultz & Newsom (2007)	CT (matched assignment at the group level) Intervention Vs Active Control.	**Characteristics:** Diagnosed with Autistic Disorder at the Pervasive Developmental Disorder clinic (prior to study). (Asperger's	**Experimental Group (n = 13):** Direct Teaching Group. <u>Programme:</u> 5 week intervention, 15 hourly sessions in total. Groups supervised by primary author. Video modelling instruction delivered followed by free-play, with	**Direct Observation:** Social Interaction Observation Code - used to measure frequency, duration and nature of social interactions for each	Both groups significantly improved in pro-social behaviours through participating in a group programme. Both groups significantly improved

	Pre and Post Testing.	syndrome, PDD-NOS excluded). **N (% Male):** 25 (80%) **Age Range:** 4 - 6 years **Mean Age:** EG = 65.00 months CG = 61.42 months	facilitators prompting practice of modelled play skills. **Control Group (n = 12):** Active - play activities group, free play.	child. Assessment of Basic Language and Learning Skills (ABLLS).	in their learning readiness and group orienteering behaviours. EG significantly greater gains in social skills (initiating behaviours, responding behaviours and interacting behaviours). All large effect sizes.
LeGoff & Sherman (2006)	Longitudinal CT (using pre-existing data). Intervention Vs Treatment-As-Usual Control (matched on age, gender, diagnosis, level of mental health)	**Characteristics:** Clinic based diagnosis of ASD - Autistic Disorder (n = 50), Asperger's Disorder (n = 55), PDD-NOS (n = 12). **N (% Male):** 117 (82%)	**Experimental Group (n = 60):** Participation in both individual and group Lego sessions continuously for at least 3 years. **Control Group (n = 57):** children referred for annual mental health assessments, receiving therapy services from other providers (treatment as usual)	**Clinician-Report:** VABS - Socialisation Subscale GARS - Social Interaction subscale (and more general autistic behaviours).	**Clinician-report:** Although all participants showed statistically significant gains following the 3 year treatment period, on both the VAB-SD and the GARS-SI, the subjects in the Lego treatment condition made greater gains[3].

	Pre (post hoc from clinical trials) and post (3 years post intervention)	**Age Range:** Not Specified **Mean Age:** TG: 9.3 CG: 10.1			
Lopata, Thomeer, Volker & Nida (2006)	Quasi-experimental (age-matched pairs) Intervention Vs Active Control. Pre and Post testing. Open Trial. Data collection over two years.	**Characteristics:** Diagnosis of Asperger's Syndrome (written documentation of formal diagnosis and review of diagnosis). **N (% Male):** 21 (100%) **Age Range:** 6-13 years **Mean Age:** 10.05 years	**Experimental Group 1 (n = 12):** Combined social skills and behaviour treatment summer programme based upon manualized Skillstreaming programme. Social skill instruction and therapeutic activity. Inclusion of behaviour management point system with response cost. <u>Programme:</u> 6 hour daily sessions X 5 (each week for 6 weeks). Daily schedule consisted of 4 x 70min treatment cycle. 4-6 children per group, 3 staff. **Experimental Group 2 (n = 9):** Social skills summer treatment programme based upon manualized Skillstreaming programme. Social	**Parent Report:** BASC- PRS - social skills, adaptability and atypicality subscales. **Teacher Report:** BASC- TRS - **s**ocial skills, adaptability and atypicality subscales.	**Parent-report:** Significant main effects for parent ratings of social skills, adaptability and atypicality for both treatment conditions[3]. No statistically significant interaction effects. **Teacher-report:** Significant improvements in adaptability for both groups[3]. No significant main effect for atypicality. Significant reduction in atypicality scale[3] No statistically significant interaction effects.

			skill instruction and therapeutic activity. Naturalistic feedback. Programme: 6 hour daily sessions X 5(each week for 6 weeks). Daily schedule consisted of 4 x 70 min treatment cycle. 4-6 children per group, 3 staff.		No significant differences between the two treatment groups.
LeGoff (2004)	Repeated Measures, Crossover Design (Intervention group served as own controls during wait-lit period) Pre and Post Testing Open Trial	**Characteristics:** Diagnosis of Autistic Disorder (n =13), Asperger's Disorder (n = 19) or PDD-NSS (n = 15). Majority attending public schools. **N (% Male):** 47 (72%) **Age Range:** 6 - 16 years **Mean Age:** 10.6 years	**Experimental Group (n = 47):** Lego Therapy - goal to improve social competence. Programme: 1 x 60 min individual session and one x 90 min Lego Club group session per week for minimum of 12 weeks. 7 groups of 6/7 participants. Sessions facilitated by author. **Control Group (n = 47):** Wait-list period prior to intervention starting.	**Direct Observation:** Self-Initiated Social Contact (SISC) - frequency count. Duration of Social Interaction (DSI) GARS - Social Interaction Subscale (based on parent, teacher and therapist input)	Statistically significant gains in all three measures of social competence were made after 12 weeks of therapy, gains sustained and even larger after 24 week period. Significant improvements in initiation of social contact with peers, duration of social interaction with peers and decreased scores on a standardised measure of social impairment.

NOTE: ASC: Adapted Skillstreaming Checklist; **ALQ:** Achieved Learning Questionnaire; **BASC - PRS:** Behavioural Assessment System for Children - Parent rating scale**;** **BASC - TRS:** Behavioural Assessment System for Children - Teacher rating scale; **BDI-Y**: Beck Depression Inventory - Youth; **CASP:** Child and Adolescent Social perception Measure; **CBCL:** Child Behaviour Checklist; **CGI-I:** Clinical Global Impression - Improvement, **CGI-S:** Clinical Global Impression - Severity**; DANVA2:** Diagnostic Analysis of Nonverbal Accuracy 2; **EDI**: Emory Dysemmia Index; **GARS**: Gilliam Autism Rating Scale; **QPQ**: Quality of Play Questionnaire; **SKA**: Skillstreaming Knowledge Assessment ; **SRS:** Social Responsiveness Scale; **SSRS**: Social Skills Rating System; **TASSK-R**:Test of Adolescent Social Skills Knowledge-Revised; **TPSS**: Teacher Perception of Social Skills; **VABS**: Vineland adaptive behaviour scale (semi-structured parent interview).

1 Significant difference between groups in change scores from pre to post intervention (i.e., an interaction between group and time that favours the experimental group)
2 Significant difference between groups in change scores from post intervention to follow-up (i.e., an interaction between group and time that favours the experimental group)
3 Significant within-group improvement at post (vs. pre) intervention
4 Significant within-group improvement at follow-up (vs. pre) intervention
5 Significant between-group differences at post-test that favours the experimental group
6 Significant between-group differences at follow up that favours the experimental group
7 Significant within-group improvement at follow-up (vs. post) intervention.

Appendix D.

School Anxiety Scale - Teacher Rating (SAS-TR; Lyneham, Street, Abbott & Rapee, 2008)

School Anxiety Scale – Teacher Report

For each item please fill in the circle that best describes how this child has been **over the last three months or this school year**. Please answer all of the items.

	Never	Sometimes	Often	Always
1. This child is afraid of asking questions in class	○	○	○	○
2. This child speaks only when someone asks a question of them	○	○	○	○
3. This child worries what other people think of him/her	○	○	○	○
4. This child does not volunteer answers or comments during class	○	○	○	○
5. This child is afraid of making mistakes	○	○	○	○
6. This child hates being the centre of attention	○	○	○	○
7. This child hesitates in starting tasks or asks whether they understood the task before starting	○	○	○	○
8. This child worries about things	○	○	○	○
9. This child worries that (s)he will do badly at school	○	○	○	○
10. This child worries that something bad will happen to him/her	○	○	○	○
11. This child seems very shy	○	○	○	○
12. This child complains of headaches, stomach aches or feeling sick	○	○	○	○
13. This child feels afraid when (s)he has to talk in front of the class	○	○	○	○
14. This child hesitates to speak when in group situations	○	○	○	○
15. When this child has a problem, (s)he feels shaky	○	○	○	○
16. This child appears nervous when approached by other children or adults	○	○	○	○

Appendix E.

Spence Children's Anxiety Scale (Spence, 1998)

SPENCE CHILDREN'S ANXIETY SCALE

Your Name: _____ **Date:** _____

PLEASE PUT A CIRCLE AROUND THE WORD THAT SHOWS HOW OFTEN EACH OF THESE THINGS HAPPEN TO YOU. THERE ARE NO RIGHT OR WRONG ANSWERS.

1.	I worry about things	Never	Sometimes	Often	Always
2.	I am scared of the dark	Never	Sometimes	Often	Always
3.	When I have a problem, I get a funny feeling in my stomach	Never	Sometimes	Often	Always
4.	I feel afraid	Never	Sometimes	Often	Always
5.	I would feel afraid of being on my own at home	Never	Sometimes	Often	Always
6.	I feel scared when I have to take a test	Never	Sometimes	Often	Always
7.	I feel afraid if I have to use public toilets or bathrooms	Never	Sometimes	Often	Always
8.	I worry about being away from my parents	Never	Sometimes	Often	Always
9.	I feel afraid that I will make a fool of myself in front of people	Never	Sometimes	Often	Always
10.	I worry that I will do badly at my school work	Never	Sometimes	Often	Always
11.	I am popular amongst other kids my own age	Never	Sometimes	Often	Always
12.	I worry that something awful will happen to someone in my family	Never	Sometimes	Often	Always
13.	I suddenly feel as if I can't breathe when there is no reason for this	Never	Sometimes	Often	Always
14.	I have to keep checking that I have done things right (like the switch is off, or the door is locked)	Never	Sometimes	Often	Always
15.	I feel scared if I have to sleep on my own	Never	Sometimes	Often	Always
16.	I have trouble going to school in the mornings because I feel nervous or afraid	Never	Sometimes	Often	Always
17.	I am good at sports	Never	Sometimes	Often	Always
18.	I am scared of dogs	Never	Sometimes	Often	Always
19.	I can't seem to get bad or silly thoughts out of my head	Never	Sometimes	Often	Always
20.	When I have a problem, my heart beats really fast	Never	Sometimes	Often	Always
21.	I suddenly start to tremble or shake when there is no reason for this	Never	Sometimes	Often	Always
22.	I worry that something bad will happen to me	Never	Sometimes	Often	Always
23.	I am scared of going to the doctors or dentists	Never	Sometimes	Often	Always
24.	When I have a problem, I feel shaky	Never	Sometimes	Often	Always
25.	I am scared of being in high places or lifts (elevators)	Never	Sometimes	Often	Always

26.	I am a good person.....	Never	Sometimes	Often	Always
27.	I have to think of special thoughts to stop bad things from happening (like numbers or words).....	Never	Sometimes	Often	Always
28	I feel scared if I have to travel in the car, or on a Bus or a train.....	Never	Sometimes	Often	Always
29.	I worry what other people think of me.....	Never	Sometimes	Often	Always
30.	I am afraid of being in crowded places (like shopping centres, the movies, buses, busy playgrounds).....	Never	Sometimes	Often	Always
31.	I feel happy.....	Never	Sometimes	Often	Always
32.	All of a sudden I feel really scared for no reason at all.....	Never	Sometimes	Often	Always
33.	I am scared of insects or spiders.....	Never	Sometimes	Often	Always
34.	I suddenly become dizzy or faint when there is no reason for this.....	Never	Sometimes	Often	Always
35.	I feel afraid if I have to talk in front of my class.....	Never	Sometimes	Often	Always
36.	My heart suddenly starts to beat too quickly for no reason.....	Never	Sometimes	Often	Always
37.	I worry that I will suddenly get a scared feeling when there is nothing to be afraid of.....	Never	Sometimes	Often	Always
38.	I like myself.....	Never	Sometimes	Often	Always
39.	I am afraid of being in small closed places, like tunnels or small rooms.	Never	Sometimes	Often	Always
40.	I have to do some things over and over again (like washing my hands, cleaning or putting things in a certain order).....	Never	Sometimes	Often	Always
41.	I get bothered by bad or silly thoughts or pictures in my mind.....	Never	Sometimes	Often	Always
42.	I have to do some things in just the right way to stop bad things happening.....	Never	Sometimes	Often	Always
43.	I am proud of my school work.....	Never	Sometimes	Often	Always
44.	I would feel scared if I had to stay away from home overnight.....	Never	Sometimes	Often	Always
45.	Is there something else that you are really afraid of?.....	YES	NO		
	Please write down what it is_____				
	_____				
	_____				
	How often are you afraid of this thing?.....	Never	Sometimes	Often	Always

Appendix F.

Spence Children's Anxiety Scale - Parent (SCAS-P; Spence,1998)

SPENCE CHILDREN'S ANXIETY SCALE
(Parent Report)

Your Name: _____ **Date:** _____

Your Child's Name: _____

BELOW IS A LIST OF ITEMS THAT DESCRIBE CHILDREN. FOR EACH ITEM PLEASE CIRCLE THE RESPONSE THAT BEST DESCRIBES YOUR CHILD. PLEASE ANSWER ALL THE ITEMS.

1.	My child worries about things.....	Never	Sometimes	Often	Always
2.	My child is scared of the dark.....	Never	Sometimes	Often	Always
3.	When my child has a problem, s(he) complains of having a funny feeling in his / her stomach	Never	Sometimes	Often	Always
4.	My child complains of feeling afraid.....	Never	Sometimes	Often	Always
5.	My child would feel afraid of being on his/her own at home.....	Never	Sometimes	Often	Always
6.	My child is scared when s(he) has to take a test.....	Never	Sometimes	Often	Always
7.	My child is afraid when (s)he has to use public toilets or bathrooms.....	Never	Sometimes	Often	Always
8.	My child worries about being away from us / me.....	Never	Sometimes	Often	Always
9.	My child feels afraid that (s)he will make a fool of him/herself in front of people.....	Never	Sometimes	Often	Always
10.	My child worries that (s)he will do badly at school.....	Never	Sometimes	Often	Always
11.	My child worries that something awful will happen to someone in our family.....	Never	Sometimes	Often	Always
12.	My child complains of suddenly feeling as if (s)he can't breathe when there is no reason for this.....	Never	Sometimes	Often	Always
13.	My child has to keep checking that (s)he has done things right (like the switch is off, or the door is locked)..	Never	Sometimes	Often	Always
14.	My child is scared if (s)he has to sleep on his/her own.....	Never	Sometimes	Often	Always
15.	My child has trouble going to school in the mornings because (s)he feels nervous or afraid.....	Never	Sometimes	Often	Always
16.	My child is scared of dogs	Never	Sometimes	Often	Always
17.	My child can't seem to get bad or silly thoughts out of his / her head.....	Never	Sometimes	Often	Always
18.	When my child has a problem, s(he) complains of his/her heart beating really fast.....	Never	Sometimes	Often	Always

19.	My child suddenly starts to tremble or shake when there is no reason for this.....	Never	Sometimes	Often	Always
20.	My child worries that something bad will happen to him/her.....	Never	Sometimes	Often	Always
21.	My child is scared of going to the doctor or dentist	Never	Sometimes	Often	Always
22.	When my child has a problem, (s)he feels shaky.....	Never	Sometimes	Often	Always
23.	My child is scared of heights (eg. being at the top of a cliff).....	Never	Sometimes	Often	Always
24.	My child has to think special thoughts (like numbers or words) to stop bad things from happening.....	Never	Sometimes	Often	Always
25.	My child feels scared if (s)he has to travel in the car, or on a bus or train	Never	Sometimes	Often	Always
26.	My child worries what other people think of him/her.....	Never	Sometimes	Often	Always
27.	My child is afraid of being in crowded places (like shopping centres, the movies, buses, busy playgrounds).....	Never	Sometimes	Often	Always
28	All of a sudden my child feels really scared for no reason at all.....	Never	Sometimes	Often	Always
29.	My child is scared of insects or spiders.....	Never	Sometimes	Often	Always
30.	My child complains of suddenly becoming dizzy or faint when there is no reason for this.....	Never	Sometimes	Often	Always
31.	My child feels afraid when (s)he has to talk in front of the class.....	Never	Sometimes	Often	Always
32.	My child's complains of his / her heart suddenly starting to beat too quickly for no reason	Never	Sometimes	Often	Always
33.	My child worries that (s)he will suddenly get a scared feeling when there is nothing to be afraid of.....	Never	Sometimes	Often	Always
34.	My child is afraid of being in small closed places, like tunnels or small rooms.....	Never	Sometimes	Often	Always
35.	My child has to do some things over and over again (like washing his / her hands, cleaning or putting things in a certain order).....	Never	Sometimes	Often	Always
36.	My child gets bothered by bad or silly thoughts or pictures in his/her head	Never	Sometimes	Often	Always
37.	My child has to do certain things in just the right way to stop bad things from happening	Never	Sometimes	Often	Always
38.	My child would feel scared if (s)he had to stay away from home overnight.....	Never	Sometimes	Often	Always
39.	Is there anything else that your child is really afraid of?	YES	NO		
	Please write down what it is, and fill out how often (s)he is afraid of this thing: _____	Never	Sometimes	Often	Always
	_____	Never	Sometimes	Often	Always
	_____	Never	Sometimes	Often	Always

Appendix G.

Social Worries Questionnaire - Pupil (SWQ-P; Spence, 1995)

SOCIAL WORRIES QUESTIONNAIRE (PUPILS)

YOUR DATE OF BIRTH: GRADE: SCHOOL:

DATE: AGE: SEX:

Please put a circle around the rating which best describes you over the past 4 weeks. Please answer all questions (Avoid means to try to get out of doing of something)

1. I avoid or get worried about going to parties	not true	sometimes true	mostly true
2. I avoid or get worried about using the telephone	not true	sometimes true	mostly true
3. I avoid or get worried about meeting new people	not true	sometimes true	mostly true
4. I avoid or get worried about presenting work to the class	not true	sometimes true	mostly true
5. I avoid or get worried about attending clubs or sports activities	not true	sometimes true	mostly true
6. I avoid or get worried about asking a group of kids if I can join in	not true	sometimes true	mostly true
7. I avoid or get worried about talking in front of a group of adults	not true	sometimes true	mostly true
8. I avoid or get worried about going shopping alone	not true	sometimes true	mostly true
9.I avoid or get worried about standing up for myself with other kids	not true	sometimes true	mostly true
10. I avoid or get worried about entering a room full of people	not true	sometimes true	mostly true
11. I avoid or get worried about using public toilets or bathrooms	not true	sometimes true	mostly true
12. I avoid or get worried about eating in public	not true	sometimes true	mostly true
13. I avoid or get worried about taking tests at school	not true	sometimes true	mostly true

Appendix H.

Social Worries Questionnaire - Teacher (SWQ-P; Spence, 1995)

SOCIAL WORRIES QUESTIONNAIRE (TEACHER)

DATE: PUPIL'S NAME: PUPIL'S SEX:

GRADE: SCHOOL: PUPIL'S AGE:

TEACHER'S NAME OR INITIAL:

Please put a circle around the rating which best describes this pupil over the past 4weeks. Please circle the **0 if the item is not true**. Circle the number **1 if the item is sometimes true**. If the item is **mostly true, then circle the number 2**. Please answer all items.

	not true	sometimes true	mostly true
1. He or she avoids or gets worried about presenting work to the class	0	1	2
2. He or she avoids or gets worried about attending parties or sports activities	0	1	2
3. He or she avoids or gets worried about approaching a group of kids to ask to join in	0	1	2
4. He or she avoids or gets worried about standing up for him/ herself with peers	0	1	2
5. He or she avoids or gets worried about answering questions in class	0	1	2
6. He or she avoids or gets worried about reading aloud to the class	0	1	2
7. He or she avoids or gets worried about asking questions in class	0	1	2
8. He or she avoids or gets worried about telling a teacher if he/she doesn't understand something	0	1	2

Appendix I.

Ethical Approval

Your Ethics Amendment (Ethics ID:5706) has been reviewed and approved

DELETE REPLY REPLY ALL FORWARD

mark as unread

ERGO <ergo@soton.ac.uk>
Fri 15/03/2013 10:14

To: ☐Fossey S.;

Submission Number 5706:
This email is to confirm that the amendment request to your ethics form (CBT for mainstream ASD pupils (Amendment 1))has been approved by the Ethics Committee.

You can begin your research unless you are still awaiting specific Health and Safety approval (e.g. for a Genetic or Biological Materials Risk Assessment)

Comments
None
Click here to view your submission

ERGO : Ethics and Research Governance Online
http://www.ergo.soton.ac.uk

Appendix J.

School Information Sheet

UNIVERSITY OF Southampton

Tackling Anxiety through Cognitive Behavioural Group Therapy

My name is Sarah Fossey and I am currently enrolled on the Educational Psychology Doctorate at the University of Southampton. I am currently on placement in Wokingham Educational Psychology Service. As part of my training, I am conducting a research project to evaluate the effectiveness of cognitive behavioural approaches in reducing anxiety in pupils with Autism Spectrum Disorder (ASD). I would like to invite pupils in your school who have a diagnosis of ASD and experience high levels of anxiety to participate in this research project.

The aim of the study

Anxiety is something we all experience and most of the time we are able to manage these feelings. However, if anxiety gets out of control then it can stop us from doing everyday things and this can lead to us feeling unhappy, upset and frustrated. Research has shown that many young people with ASD experience higher levels of anxiety than their peers. This anxiety can impact upon school performance and peer relationships. Where feelings of anxiety become too strong, pupils may not be able to deal with them on their own and support is required. Cognitive behavioural group-based interventions have been used in clinical settings to help young people with ASD to understand their emotions and to feel less worried or anxious. This approach focuses on the link between what we think, what we feel and how we behave.

This study aims to find out whether a cognitive-behavioural intervention is effective in reducing the anxiety levels of young people with ASD, when delivered within the school setting. It also aims to explore whether reducing the anxiety levels of ASD pupils impacts upon their social responsiveness and ability to attend. The intervention will be the 'Exploring Feelings' cognitive behaviour therapy programme (Attwood, 2004), designed as a treatment for anxiety disorder in children with High-Functioning Autism.

What is involved?

To investigate the effectiveness of the intervention, there will need to be both an intervention group and a control group within each participating school. The study aims to recruit 3 – 6 pupils for the intervention group and the same number for the control group. Pupils in the intervention group will receive 6 weekly sessions of group-based cognitive behavioural therapy. This will include activities and information to understand the specific feelings of being happy, relaxed and anxious, exploring the physiology, thinking and behaviours associated with these emotions. Participants will develop a 'tool box' for managing anxiety both at home and at school. Each participant will have a workbook containing information from the sessions which they will take away on completion. At the end of each session, a home project will be explained to participants. Each group session will last for 1.5 hours and will start with a warm-up game so that everyone will relax and enjoy the sessions. Pupils in the control group will not receive the intervention as part of the study. This is to ensure that any change in the pupils anxiety levels can be attributed to the intervention. School staff will however be asked to assist the researcher in delivering the intervention enabling the groups to continue running after the research and allowing pupils in the control group to receive the intervention at a later date.

A questionnaire will be used to measure pupils anxiety before and after the intervention. One questionnaire will be completed by the pupils themselves and one by their parents. In addition, a member of school staff who knows the pupil well will also be asked to complete a short, 16-item questionnaire. This should take no more than 10 minutes to complete. Pupils will also be asked to complete a short computer-based attention assessment. All measures will be completed for pupils in both the intervention and the control group. Six weeks after the intervention is complete, follow-up outcome measures will be re-administered to parents, teachers and the participants themselves.

How will participants be selected?

The researcher will initially ask schools to identify all pupils who have a diagnosis of ASD. Parents of these pupils will then be approached and asked to consent to their child’s participation in the study. Once consent has been recieved, the researcher will request a copy of each pupils diagnosis report from the school or from parents. Parents will be asked to complete an anxiety questionnaire. Pupils will need to reach a cut-off

point on this questionnaire to ensure that they have significant symptoms of anxiety. In addition, the researcher will need to assess each pupils verbal ability using a standardised assessment, this will take approximately thirty minutes. Pupils who meet all of the requirements of the study will be asked to consent to their own participation. It will be made clear to them that they do not have to partipate and that there will be no negative consequences should they choose not to.

How will school staff be involved in the research?

As well as being asked to support the researcher in identifying pupils suitable for the groups and completing the questionnaires, a member of school staff will be asked to assist the researcher in delivering the intervention. This is to ensure that pupils feel more relaxed by having a familiar adult within the sessions and also to allow schools to continue running the groups after the study. Before running the intervention, a teaching session will be arranged between the researcher and this member of school staff to ensure that they understand the key principles of the cognitive-behavioural approach and are familiar with the programme itself. The intervention will be run within schools and therefore schools will also be asked to ensure that there is a suitable space available each week.

What will happen after the study?

The findings will be presented in a report to be submitted to the University of Southampton. It is also possible that the findings are presented in academic forums or submitted for publication in academic journals. A summary of the findings can also be provided for the school once the research is finished. All data will be anonymised.

This study has been reviewed and approved by the University of Southampton, School of Psychology Ethics Committee. All necessary safeguarding checks and references have been successfully completed.

I very much appreciate your support in putting this programme in place and hope that those pupils who participate will benefit from this experience. If you have any questions please do not hesitate to contact me via e-mail: xxxxxxxxxxxxx, or telephone: xxxxxxxxxxxxxx.

Appendix K.

Parent Information Sheet and Consent Form

UNIVERSITY OF Southampton

Tackling Anxiety through Cognitive Behavioural Group Therapy

My name is Sarah Fossey and I am currently training to be an Educational Psychologist at the University of Southampton. As part of my training I am conducting a research project and I would like to invite your child to participate in this.

What is the purpose of this study? Anxiety is something we all experience and most of the time we are able to manage these feelings. However, if anxiety gets out of control then it can stop us from doing everyday things, leading us to feel unhappy and frustrated. Research has shown that many young people with Autism Spectrum Disorder (ASD) experience high levels of anxiety. Where these feelings become too strong, pupils may not be able to deal with them on their own and support is required. This study aims to find out whether a group-based programme can be delivered in schools to reduce the level of anxiety experienced by pupils with ASD.

Why has your child been selected? A number of Secondary Schools across Wokingham have been asked to be involved in this project. Your child's school were asked to identify pupils who have a diagnosis of Autism Spectrum Disorder for potential participation. If you are happy for your child to be considered for this project, I will first of all need to ensure that the group-based programme will be appropriate for them. Firstly, I will need confirmation from yourself or the school that they have an official diagnosis of ASD. I have also enclosed two questionnaires for completion: The Social Communication Questionnaire and The Social Responsiveness Questionnaire. These will enable me to see any particular areas of difficulty your child experiences. Secondly, all pupils who take part in the study must have significant anxiety. I have attached a short questionnaire for you to complete – this will indicate how anxious your child is. As we are asking pupils to be a part of group-work, pupils will also need to be verbally able. I will meet with your child at school to complete a few short tasks to confirm this (taking no more than thirty minutes).

Once these things have been checked, you will be contacted by myself or the school to inform you as to whether the groups are suitable for your child. For those pupils who meet this criteria, some will take part in the groups immediately and some will not. Those who don't will be in a 'control' group. We need to have one of these so that we can be sure that any changes are due to the programme. Pupils who are not taking part in the groups for the project, will still be asked to complete some questionnaires so that we can compare the anxiety levels of those who have and haven't been involved in the groups. When the groups are run, a member of school staff will be asked to be involved. The aim of this is that schools will become familiar with the programme and if it is shown to be effective will be able to run further groups themselves. Therefore your child may be invited to take part in groups after the study is complete.

What will happen to my child if they take part? Before the group sessions begin, all pupils will be asked to complete their own questionnaire about how anxious they feel. A member of school staff will also complete a similar questionnaire. Pupils will then be asked to complete a short computer-based attention assessment. This is a fun task in which they are asked to press different arrows on the keyboard based on the direction of an arrow seen on the screen. Those participating in the group sessions will then attend six weekly sessions, each lasting around 1.5 hours. These will be run the same time each week with between 3 and 6 pupils in the group. At the beginning of each session we will play a warm-up game to ensure that everyone feels relaxed. We will be doing lots of fun activities exploring how it feels to be anxious and what we can do to help us feel less anxious. Pupils will develop a 'tool box' of strategies for managing anxiety both at home and at school. They will also all get a workbook containing information from the sessions which they will take away on completion. At the end of each session, a home-based task will be set. This is to enable them to practice what we have been learning. Before the groups begin I will provide information regarding each of these so that you are able to support your child with them. After the six sessions, and again six-weeks later, I will again send out questionnaires to be completed and meet with your child at school so that they can complete theirs. This is so that we can see whether any effects remain over time.

Does my child have to take part? No, it is up to you and your child to decide. If you WISH for your child to take part in this study, please sign and return the consent form

and the questionnaire attached. Also, if you agree for your child to take part, they will still be free to withdraw at any time, without giving a reason, if they choose to do so.

What are the possible disadvantages and risks of taking part? We are aiming for the sessions to be enjoyable and interesting for pupils, where they have the opportunity to be involved and share their views. However, should any of the pupils experience difficulties during or after the sessions, a named member of school staff will be available to provide support to individual pupils.

What are the possible benefits of taking part? It is hoped that pupils will greatly benefit from taking part in this study, being able to understand and cope with feelings of anxiety. Furthermore, this is an area of great interest to the schools as they are keen to ensure that all pupils feel relaxed and happy at school. The information generated from this study may help to ensure that schools feel confident in supporting ASD pupils who experience anxiety.

What will happen after the study? The findings will be presented in a report to be submitted to the University of Southampton. It is also possible that the findings are presented in academic forums or submitted for publication in academic journals. A summary of the findings can also be provided once the research is finished. It is important to note that all data will be anonymised, therefore your child will not be identifiable.

What if there is a problem? This study has been reviewed and approved by the University of Southampton, School of Psychology Ethics Committee. All necessary safeguarding checks and references have been successfully completed. If you have any questions or want to discuss this further, please do not hesitate to contact me via e-mail: xxxxxxxxxxxxxxxxxx, or telephone: xxxxxxxxxxxxxxx

If you have any complaints, concerns or questions about this research please feel free to contact Sarah Fossey at the University of Southampton, Building 44A, SO17 1BJ (sf14g11@soton.ac.uk, Tel: 02380 595320). If you wish to complain formally you can also write to the Chair of the Ethics Committee, School of Psychology, University of Southampton, Southampton, SO17 1BJ. (Tel: 02380 594663).

Study title: Tackling Anxiety through Cognitive Behavioural Group Therapy
Researcher name: Sarah Fossey
Study reference:CBT
Ethics reference: 5706

Thank you for your interest in taking part in this research. If you agree that the research project named above has been explained to you and are happy for your child to take part in the study please read and complete the form below.

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet (date 10/02/13) and have had the opportunity to ask questions about the study. ☐

I consent to the researcher using my child's information and information I give about my child for the purposes of this ☐

I understand that participation is voluntary and that if I or my child decide at any time that we no longer wish to take part in this study, we can notify the researcher and withdraw immediately. ☐

Data Protection

I understand that information collected about my child during participation in this study will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998. Data will be stored on a password protected computer and will only be used for the purpose of this study. All files containing any personal data will be anonymised.

Child's Name: .....
School: .....
Name of parent/ guardian:.....
Signature of parent/ guardian:.....
Date:.....

Appendix L.

Pupil Information Sheet and Assent Form

Exploring Feelings – Fighting Anxiety

My name is Sarah Fossey and I am a Trainee Educational Psychologist. I work with children and young people who might be finding school difficult. I work with teachers to see how we can make things better for them. I am going to be doing some work in your school in small groups to help pupils to cope with things that make them feel worried or anxious. Before you decide whether you would like to take part, it is important for you to know why I am doing this work and what you will have to do. Please take time to read this sheet carefully. If there is anything you are not sure about you can ask your teacher about it.

What work will we be doing?

We feel anxious when we are worried or scared. Anxiety is something we all experience and most of the time these feelings are fine. However, if anxiety gets out of control then it can stop us from doing everyday things and this can lead to us feeling unhappy, upset and frustrated. Being anxious can stop us from spending time with our friends and having fun. The groups will try to help you to learn how to feel less worried or anxious and to understand why you might feel like this sometimes.

What will happen if you take part in this project?

If you agree to take part in the groups, I will firstly come and meet with you at your school. We will spend some time doing some activities together - this won't take too long! I will also ask you to complete a questionnaire at

school – your teacher can help you with this. The questions will ask you about how worried or anxious you get in and out of school. It is not a test and there are no right or wrong answers. Your teachers will give the questionnaires back to me when they are finished – I won't show or tell anyone what you have written. It's ok if you want to talk to your friends about them though.

You and some other young people from your school will then take part in 6 group sessions with me and (NAMED MEMBER OF STAFF). These will happen once a week. We will work together to help each other and think of ways to overcome our worries. At the start of each meeting we will play a warm-up game so that we all feel relaxed and enjoy ourselves. We will spend time chatting as a group and sharing our ideas. Sometimes you might be asked to do an activity at home – this is so we can all practice what we have learnt. Once the sessions have finished, you will be asked to complete the questionnaires again. Some of you will come to the groups this term and some of you will be able to go to groups in September.

<u>Do I have to take part in the groups?</u>

It is up to you whether you want to take part in the groups. If you agree to and then change your mind that's ok, just tell me or your teacher. You will be able to say No to the project at any time. If you agree to take part, you will be asked to fill in a form to say that you want to. We have also asked your parents to give permission for you to come to the group sessions, so you can talk to them about it too.

Exploring Feelings – Fighting Anxiety

You have been asked to take part in a project looking at how we can tackle feeling worried and anxious. If you would like to take part in this project, please read and complete the form below. If you are unsure about anything or need help reading this form please ask your teacher.

Please tick the boxes if you agree with the statements:

I have read and understood the information sheet (date 10/02/13) and have been able to ask questions about the project.	☐
I am happy for the researcher to use my information for this project.	☐
I understand that if I decide at any time that I no longer wish to take part in this study, I can tell the researcher or my teacher and stop straight away - this is ok!	☐
I understand that information will be treated as strictly confidential	☐

Name of your School:.....

Your Name:.....

Your Signature.....

Date:.....

Appendix M.

Parent Debrief

Dear Parent/ Carer,

Thank you for taking part in this research project. The purpose of this study was to evaluate the effectiveness of a group-based programme delivered within schools to reduce the level of anxiety experienced by pupils with Autism Spectrum Disorder (ASD). The programme evaluated aimed to support pupils to both understand anxiety and to develop coping strategies to manage times when they experience feelings of worry or anxiety. Furthermore, it was hoped that if shown to be effective, the programme may continue to be used within schools to support ASD pupils.
When I analyse the information collected, I will be looking to see whether there has been a change in the levels of anxiety experienced by pupils (as reported by parents) before and after attending the group sessions. This will be compared to the before and after anxiety scores of pupils who did not participate in the groups. This is to determine whether any change in scores can be attributed to having attended the programme. I will also be looking for changes in pupils responsiveness to social situations and ability to attend. As well as sharing this information with schools, Wokingham Educational Psychology Service will be informed of the results. This is to allow them to support schools in delivering such groups in the future if found to be effective. As previously stated, please be reassured that individual children will not be named in any data shared with the school, Southampton University or Wokingham Educational Psychology Service.

We hope that your child enjoyed being a part of this study and for those who attended, found the groups helpful and interesting.

If you have any questions about the project please feel free to contact me:

xxxxxxxxxxxxxx or xxxxxxxxx.

Thank you for helping with this project.

Sarah Fossey
Trainee Educational Psychologist, University of Southampton.

Appendix N.

Pupil Debrief

UNIVERSITY OF Southampton

Tackling Anxiety Together

Dear Pupil,

Thank you for helping me with my project and working so hard in the group sessions! I hope that you have found the groups helpful and have enjoyed the activities.

We wanted to see whether working together in a group could help you to feel less anxious and worried. We hope you now have lots of ideas for tackling anxiety that you can use both at home and school. Don't forget that you have your workbook to remind you of everything we have chatted about!

If you have any questions about the project please talk to your teacher or (Named Person as identified by school).

Thank you

Sarah

Appendix O

Reliable Change Calculations

The Reliable Change Index (RCI) is calculated through three steps:

Step 1. Standard Error is calculated using:

$$S_E = SD_1\sqrt{1 - r_{xx}}$$

Step 2. Standard Difference is calculated using:

$$s_{diff} = \sqrt{2(S_E)^2}$$

Step 3: Reliable Change is calculated using:

$$RC = \frac{x_2 - x_1}{s_{diff}}$$

In these formulas, S_E represents the standard error of measurement, SD_1 is the pooled standard deviation of the intervention and control group at pre-test for the measure in question and r_{xx} represents the test re-test reliability of this measure, S_{diff} represents the standard error of difference between two test scores, RC stands for 'Reliable Change, x^1 represents the pre-test score of an individual on a particular measure and x^2 is the corresponding post-test score.

Change exceeding 1.96 times the standard error is unlikely to occur more than 5% of the time by unreliability of the measure alone. For the purpose of clarity the formula has been re-arranged to become:

RCI = 1.96 * Sdiff

Worked example: Parent-report anxiety T1 - T2

Pooled standard deviation for both the intervention and control groups at baseline = 13.535

Reliability of measure between pre and post intervention scores for the control group = .742

Thus:

$$SE = SD\sqrt{1 - rel}$$
$$SE = 13.535\sqrt{1 - .742}$$
$$SE = 6.87$$

$$Sdiff = \sqrt{2(S_E)^2}$$
$$Sdiff = \sqrt{2(6.87)^2}$$
$$Sdiff = 9.72$$

$$RC = 1.96 \text{ x } Sdiff$$
$$RC = 1.96 \text{ x } 9.72$$
$$RC = 19.06$$

Change scores above 19.06 points can be considered to have changed reliably.

Appendix P

Reliable Change Figures

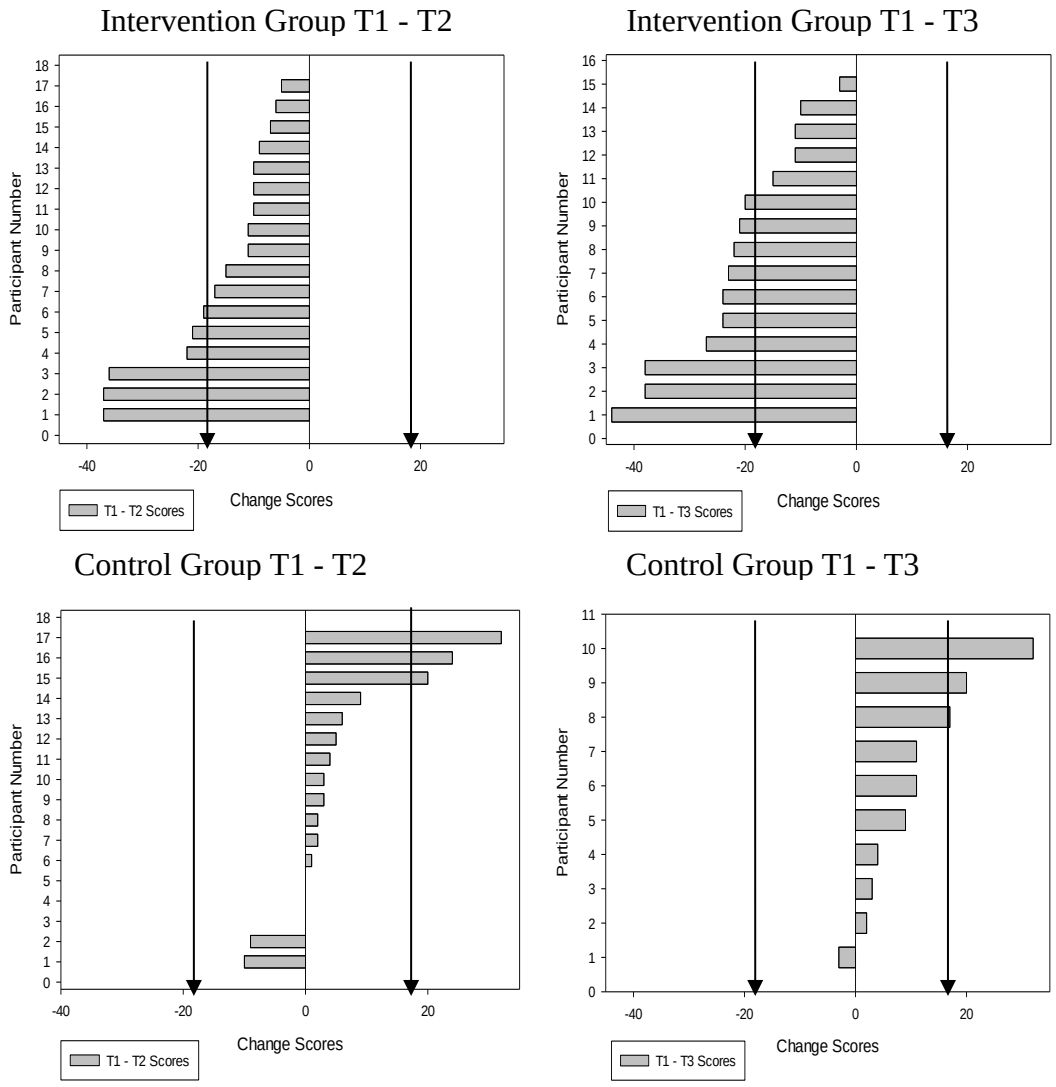

Figure 8. Parent-report anxiety change scores between T1-T2 and T1-T3 by group. Arrows indicate Reliable Change Criterions: T1-T2 Reliable Change Criterions = 19.06, T1-T3 Reliable Change Criterion = 19.39.

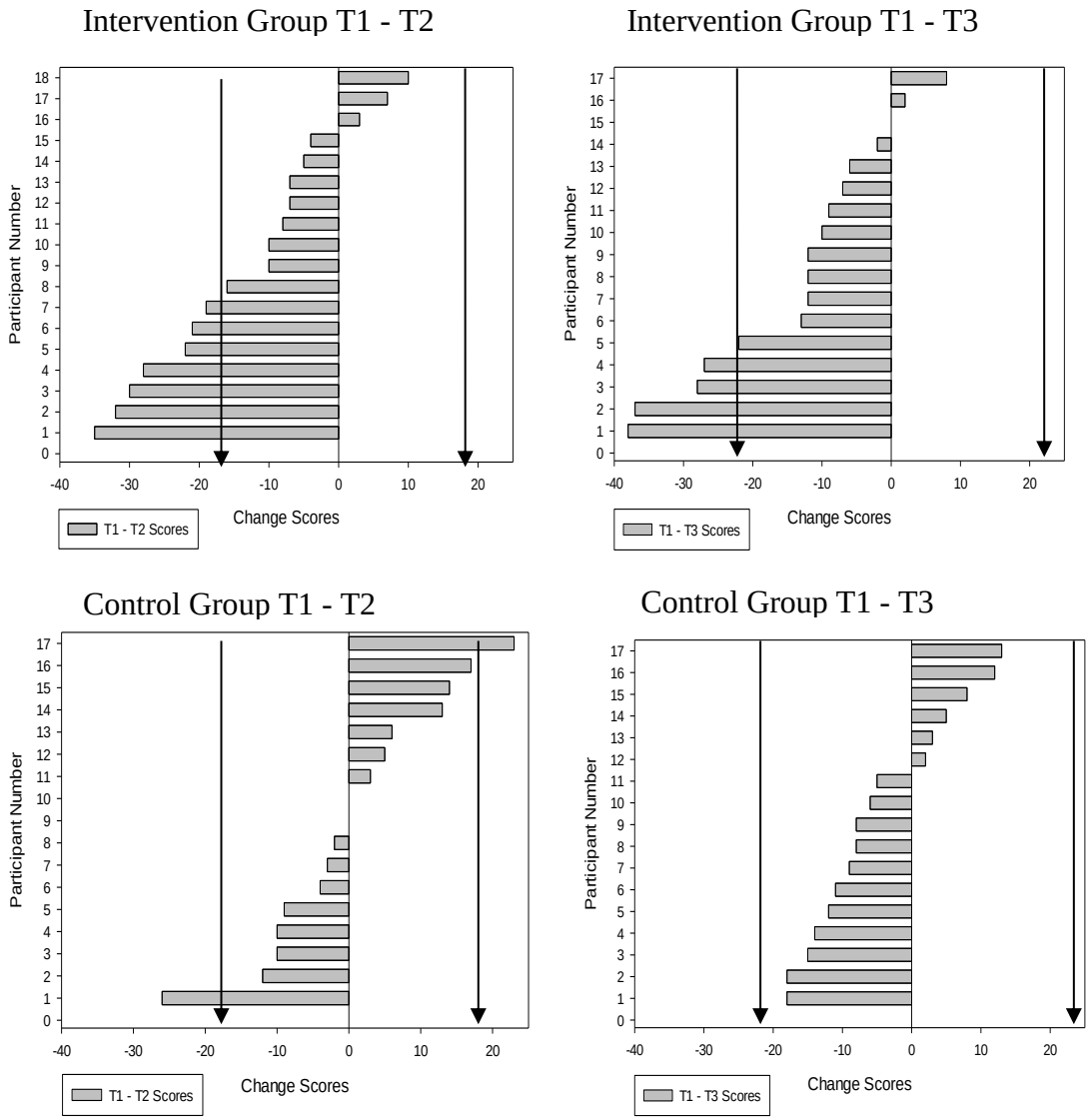

Figure 9. Self-report anxiety change scores between T1-T2 and T1-T3 by group. Arrows indicate Reliable Change Criterions: T1-T2 Reliable Change Criterions = 18.50, T1-T3 Reliable Change Criterion = 21.36.

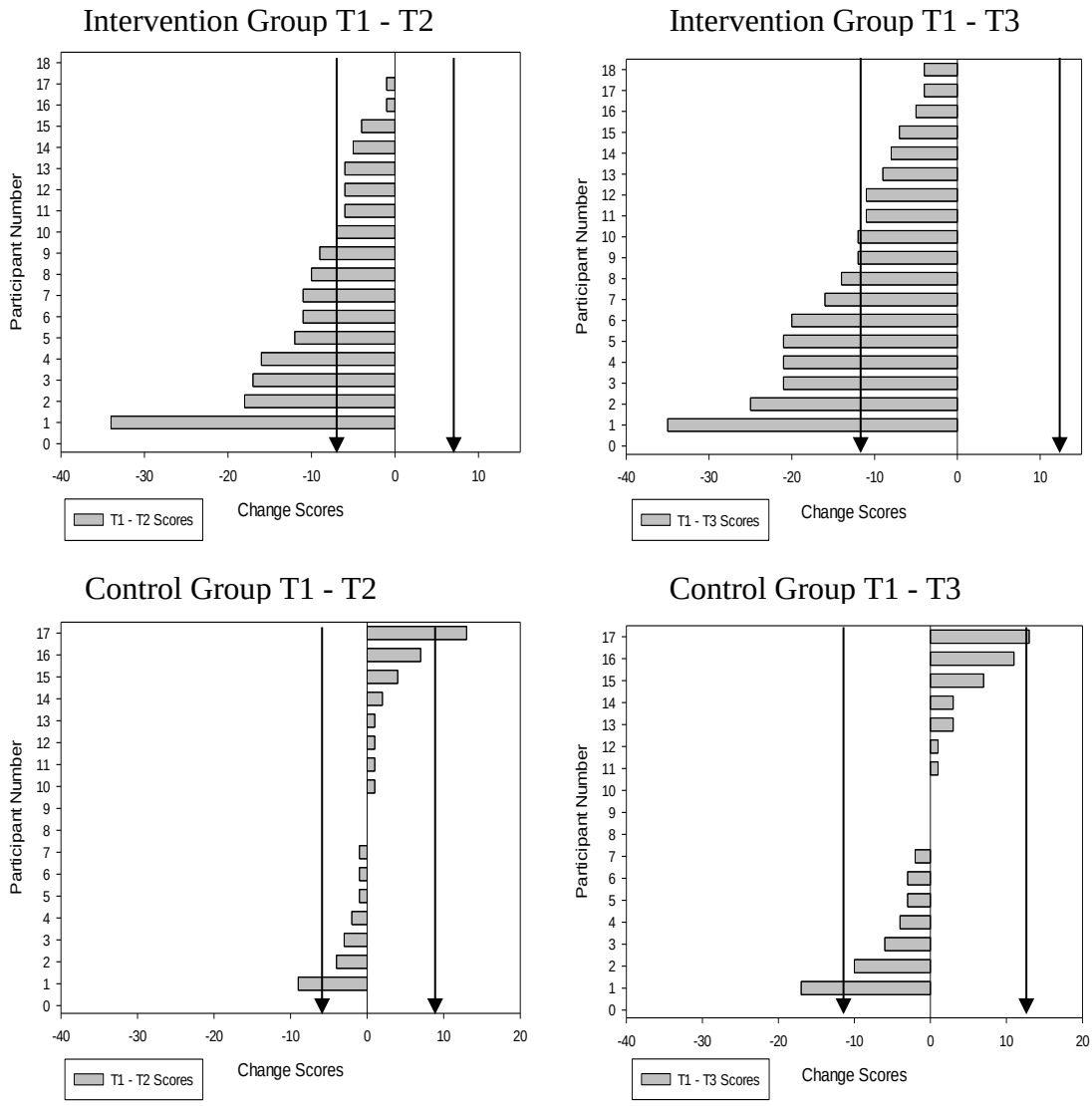

Figure 10. Teacher-report anxiety change scores between T1-T2 and T1-T3 by group. Arrows indicate Reliable Change Criterions: T1-T2 Reliable Change Criterions = 8.15, T1-T3 Reliable Change Criterion = 11.28.

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