Parent-child interaction in children with autism spectrum disorders and anxiety

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Summary

An emerging body of research reflects high rates of co-occurring anxiety symptoms in children with autism spectrum disorder (ASD), however our understanding of the nature of anxiety in this population is in its infancy. Despite this, it is clear anxiety can have a significant impact on functioning and quality of life for children with ASD. The aim of this study was to examine potential causal and maintaining factors of anxiety in children with ASD, specifically in relation to parent-child interactions, and parent and child cognitive factors. The study was based on an experimental design with a sample of parent-child dyads comprising children with anxiety disorders (n = 20), children with ASD and anxiety (n = 19), and non-clinical children (n = 18). The thesis is comprised of three separate papers utilising this sample. Paper 1: Parent-child interaction in children with autism spectrum disorder and anxiety disorders; Paper 2: Parental fear of negative child evaluation and its association with parental overinvolvement in children with autism spectrum disorder and anxiety disorders; Paper3: Ambiguous threat interpretation in children with autism spectrum disorder and anxiety disorders.

The results indicated parents of children with ASD and anxiety were significantly more involved than parents of children with anxiety alone; and parental fear of negative child evaluation (FNCE) was associated with higher levels of anxiety and involvement, with parents of children with ASD reporting significantly higher levels of FNCE. With respect to child threat interpretation, anxious children reported significantly higher levels of perceived threat in social situations as compared to children with both ASD and anxiety.

The findings provide preliminary support for the role of overinvolvement in the development and/or maintenance of anxiety in children with ASD that emphasises a relationship between parent-child interaction and anxiety. However an important distinction, and area of further research, is the interaction between core ASD symptoms and anxiety. Furthermore, the findings suggest possible differences in threat interpretation bias between typically developing children with anxiety and children with both ASD and anxiety, with a possible lack of interpretation bias in social situations for children with ASD and anxiety.

Certification by Candidate

I certify that this thesis has not been submitted for a higher degree to any other university or institution. Data collection, analysis and writing were all completed during my higher degree candidature. Approval for the research presented in this thesis was obtained from the Macquarie University Human Research Ethics Committee (reference number: 5201200790).

Anna Kelly
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Chapter 1

General Introduction

Introduction[1]

Autism spectrum disorder (ASD) affects approximately 1% of the population and is characterised by impaired social communication and interaction, and restricted and repetitive behaviour and interests, as described by the current Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013). The social impairments of ASD can manifest as deficits in social-emotional reciprocity, communication deficits and difficulty understanding, developing and maintaining social relationships. Restricted and repetitive behaviours or interests can include an insistence on sameness, restricted and fixated interests, and sensory processing difficulties. Rapidly increasing prevalence rates have prompted talk of an autism epidemic, however evidence suggests it is not likely to be a true increase, but instead the result of other factors including broader diagnostic classification and increased awareness of cases (Williams et al., 2014a).

The current DSM-5 classification of ASD has combined previously distinct diagnoses of Asperger's disorder, pervasive developmental disorder not otherwise specified and autistic disorder into one category, conceptualising autism as a continuum rather than related but distinct groups (McPartland & Dawson, 2014). As suggested by the word *spectrum* there is considerable variability within the diagnostic category in terms of behaviour, communication and sensory profile, as well as intellectual ability and psychiatric comorbidity (Myers & Johnson, 2007; Prior, Roberts, Rodger, & Williams, 2011). Despite this variability, impairments are pervasive and sustained, and while some individuals with ASD are able to develop compensatory strategies, the interpretation of complex social cues generally remains challenging, as do skills such as

[1] This thesis is presented in a 'thesis by publication' format as outlined and recommended by the Macquarie University Higher Degree Research Unit. It is comprised of five chapters consisting of three individual papers prepared for publication and an overall introduction and discussion. As a result of the thesis' structure, there is some unavoidable repetition across chapters.

planning, organisation and coping with change; all of which impact adaptive functioning even for high functioning individuals and can cause difficulties with independent living in adulthood (American Psychiatric Association, 2013).

Given the developmental impairments associated with ASD and the prominence of ASD characteristics, it is not surprising other co-morbid disorders can be overshadowed and overlooked (Kerns & Kendall, 2014). Despite this, comorbidities are common and include anxiety, intellectual impairment, disruptive behaviour disorders, sleep disorders and mood disorders (Nebel-Schwalm & Worley, 2014). Amongst this potential comorbidity, anxiety is one of the most common. Anxiety involves the anticipation of future threat, and anxiety disorders are characterised by excessive fear and anxiety as well as associated disturbances in behaviour (American Psychiatric Association, 2013).

Reports of potential anxiety comorbidity date back to the early descriptions of autism from the 1940's when both Kanner and Asperger independently talked of symptoms of anxiety in their patients (Kerns & Kendall, 2014). In the following decades, anxiety received very little attention in the ASD population, however in recent years research has grown considerably and it is clear anxiety symptoms are common and can exacerbate difficulties associated with ASD and cause significant functional impairment and distress beyond the presence of ASD alone (White, Oswald, Ollendick, & Scahill, 2009; Wood & Gadow, 2010). Despite the recent increase in research, our understanding of anxiety in young people with ASD is still emerging and requires ongoing empirical investigation of presentation and assessment, as well as causal and maintaining factors in order to guide and inform treatment.

Background Literature Review

Prevalence of anxiety in ASD

Studies reporting prevalence of anxiety in children with ASD are notable for their variability with figures ranging from 11% to 84% (White et al., 2009). In prevalence studies based on a diagnosed anxiety disorder, Ferdinand, Meester, de Nijs and Verheij (2006) found that 55% of children with ASD met criteria for one or more anxiety disorders, and Simonoff et al. (2008) found almost 42% of children met criteria for an anxiety disorder. This compares with anxiety rates of approximately 10% in typically developing children (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003). Almost all prevalence studies have used anxiety measures validated for typically developing children, however an exception to this is Leyfer et al. (2006) who developed a measure specifically designed to identify comorbidity in individuals with autism - the Autism Comorbidity Interview (ACI). Using this measure, Leyfer et al. found a similar prevalence rate to other diagnostic instruments, with 44% of children aged between 5 and 17 years experiencing at least one comorbid anxiety disorder; which taken together with other studies suggest a likely anxiety prevalence rate of almost half of all children with ASD.

A comparison with other developmental disorders, also reveals higher rates of anxiety in children with ASD. For example, a comparison of children with ASD and children with down syndrome revealed ASD children experienced higher rates of social anxiety and specific phobias (associated with situations and medical fears), however the ASD group did report lower levels of anxiety for specific fears associated with animals or harm/injury (Evans, Canavera, Kleinpeter, Maccubbin, & Taga, 2005). A further study comparing children with ASD and children with specific language impairment found significantly higher levels of anxiety symptoms in the ASD group, particularly with

respect to separation anxiety and OCD symptoms (Gillott, Furniss, & Walter, 2001). A comparison of children with both ASD and ADHD, and children with ADHD alone, revealed significantly higher levels of anxiety in the ASD/ADHD group, in particular more severe social anxiety, specific phobia and OCD symptoms (Gadow, DeVincent, & Schneider, 2009). It is clear anxiety and ASD frequently co-occur, suggesting a greater vulnerability to anxiety as compared to both typically developing children and children with other developmental disabilities.

Anxiety assessment in ASD

The reported variability in prevalence rates of comorbid anxiety may reflect in part a lack of standardised anxiety assessment measures for individuals with ASD. In recent years a few measures have been developed to assess a broad range of comorbid psychopathology in children with ASD (Leyfer et al., 2006; Matson & Wilkins, 2008; Matson et al., 2009), however these are in their infancy and require further analysis of reliability and validity. Diagnostic overshadowing and symptom overlap further complicate accurate assessment of anxiety comorbidity (Hagopian & Jennett, 2014; White et al., 2009; Wood & Gadow, 2010). Diagnostic overshadowing, which refers to the tendency for mental health problems to be overlooked and attributed instead to a pre-existing intellectual or cognitive impairment (Mason & Scior, 2004), is common in ASD as clinicians can have difficulty recognising anxiety in the presence of characteristics inherent to ASD (Kerns & Kendall, 2014).

Potential overlapping symptoms between ASD and anxiety can also make differentiation difficult. For example, there is evidence that difficulties with social reciprocity and restrictive and repetitive behaviours do not discriminate between children with ASD and anxiety disorders, as individuals with anxiety can also present with these behaviours (Hartley & Sikora, 2009). In addition, social avoidance may be a

reflection of impaired social communication or a lack of social motivation, both of which can be associated with ASD, or it may be related to a fear of negative evaluation as evident in social anxiety (Wood & Gadow, 2010). Further work is needed in developing measures that reliably distinguish comorbidity in the presence of potential symptom overlap.

A further complication associated with assessment relates to the potential difficulty obtaining accurate diagnostic information. In addition to impaired communication, children with ASD often have difficulty recognising and describing affective and physiological states (Losh & Capps, 2006; Ozsivadjian, Knott, & Magiati, 2012), which can not only affect self-report but may also impact the parent or carer's awareness of the presence of anxiety symptoms (Grondhuis & Aman, 2012). As a result, child reports may not accurately capture the presence of anxiety, and parents often need to make assumptions about anxiety triggers and behaviours (Ozsivadjian et al., 2012).

The nature of anxiety in children with ASD

Difficulties associated with anxiety assessment also reflect uncertainty regarding the conceptualisation of anxiety in ASD. Questions have been raised regarding the nature of anxiety in this population and whether it can be adequately represented by the current model of clinical anxiety (Kerns & Kendall, 2012). A review of the evidence suggests at least some children with ASD show typical symptoms of clinical anxiety (consistent with DSM-defined categories) that are distinct from ASD-related characteristics (Kerns et al., 2014; Wood & Gadow, 2010).

However, in addition to the presence of typical anxiety there is also some evidence of atypical anxiety in children with ASD (either alone or alongside typical anxiety presentations), which may represent ASD-specific variants of anxiety (Kerns & Kendall, 2012; Kerns et al., 2014). For example, social avoidance and distress may be

present with limited fear of negative evaluation of the situation as is inherent in social anxiety disorder (Leyfer et al., 2006), and rigid behaviours and adherance to self-imposed rules may be present without it being clear as to whether the intent of the behaviour is to reduce distress or negative outcomes as is the case with OCD (Muris, Steerneman, Merckelbach, Holdrinet, & Meesters, 1998; Ozsivadjian et al., 2012). White et al. (2009) suggest interaction between anxiety and core ASD features such as processing difficulties and sensory sensitivities is likely to affect the expression of anxiety and may account for atypical presentations.

Ollendick and White (2012) conceptualise the presence of anxiety in individuals with ASD in relation to both shared and unique processes. They suggest shared processes (i.e. those common to anxiety in typically developing children) include physiological hyperarousal, negative information processing bias and unhelpful cognitions; while processes more likely to be unique to anxiety in individuals with ASD include social confusion/distress, negative interpersonal exchanges associated with impaired social skills, deficits in emotional awareness in self and others, sensory defensiveness and cognitive factors such as rigidity. While intuitive, this conceptualisation remains to be empirically tested.

In their model of the development of clinical anxiety in children with ASD, Wood and Gadow (2010) suggest ASD-related stresses may contribute to the development of anxiety in two ways. Firstly, stress associated with ASD characteristics such as sensory sensitivities or social confusion may contribute to increased negative affect, which can in turn be a risk factor for anxiety. For example, Bellini (2006) found social skill deficits and physiological arousal were significant predictors of social anxiety in ASD youth. There is also evidence of an association between sensory over-responsivity and anxiety,

and while the direction of this effect is unclear (Ben-Sasson et al., 2008), a reciprocal relationship is hypothesised (Green & Ben-Sasson, 2010).

Secondly, Wood and Gadow (2010) suggest stressors associated with ASD may become the focus of fear and anxiety through fear conditioning. For example, repeated experiences of social rejection in response to social skill deficits may result in an increased risk of social anxiety; and specific phobias, which are one of the most common anxiety disorders in children with autism (Sukhodolsky et al., 2008), can arise from ASD-related stressors such as sensory sensitivities to loud noises (Green & Ben-Sasson, 2010). It is clear how stressors associated with core ASD features could contribute to an increased vulnerability to anxiety through both an increase in negative affect and specific fear conditioning. White et al. (2014) suggest these and other ASD-related processes interact with emotion regulation impairments inherent to ASD, to contribute to the increased risk of anxiety.

Conversely, anxiety can exacerbate deficits associated with ASD and can contribute to additional impairment (White et al., 2009; Wood & Gadow, 2010). For example, social anxiety may exacerbate social and communication difficulties through social avoidance and a lack of opportunities to interact with peers, as well as negatively impacting performance of social skills (White, Schry, & Kreiser, 2014). fMRI results based on processing of emotional faces suggest the presence of social anxiety in people with ASD may intensify impairments in emotional processing (Kleinhans et al., 2010).

There is also evidence anxiety may exacerbate behavioural difficulties associated with ASD (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; White, Kreiser, Pugliese, & Scarpa, 2012; White et al., 2009). In addition to the core impairments, children with ASD can exhibit problem behaviours including disruptive behaviour, tantrums and impulse control difficulties (Brereton, Tonge, & Einfeld, 2006; Fodstad, Rojahn, &

Matson, 2012). These behaviours are likely to be associated with emotional dysregulation which can be an inherent, although heterogeneous, part of ASD (Mazefsky et al., 2013).

Given the inherent dysregulation, it is not surprising there is evidence that anxiety and fear are more likely to be associated with acting out behaviours in children with ASD as compared to non-ASD children (Farrugia & Hudson, 2006; White et al., 2009) and children with other developmental disorders comorbid with anxiety (Evans et al., 2005). In one study of children with ASD and co-occurring anxiety, 41% of children were found to also meet criteria for either oppositional defiant disorder or conduct disorder, and these children experienced greater anxiety symptom severity than children with ASD and anxiety alone (Storch et al., 2012). While there are a number of possible explanations, Storch et al. hypothesise that children with ASD and anxiety may be more likely to use externalising behaviour to avoid anxiety-provoking situations, leading to these behaviours being negatively reinforced, as well as compounding the anxiety.

Overall, there is likely to be a complex interaction between ASD and anxiety that influences the nature and presentation of anxiety in children with ASD, as well as the increased prevalence. A bidirectional relationship is likely, with the potential for ASD characteristics and stressors to contribute to anxiety, and conversely for anxiety symptoms to exacerbate ASD impairments. Of course this interaction is not limited to anxiety, and is also likely to be evident with respect to other emotional and behavioural comorbidity.

Parent-child factors in ASD families

The interaction between parent and child factors is likely to be associated with anxiety in ASD, however this has not yet been subject to empirical investigation. The

notable lack of research in relation to the nature of parent-child interaction, and the potential role this might play in the development and maintenance of anxiety, is surprising. This is particularly given the large body of empirical support for an association between parent behaviours, such as control and negativity, and anxiety in typically developing children (Rapee, 2012). Reaven and Blakeley-Smith (2013) suggest the lack of research may in part reflect a reluctance to focus on the parent-child relationship in ASD given historical and now discredited research that presented parents, and particularly mothers, as contributing to the development of ASD (Bettelheim, 1967). However, parent factors are particularly salient when seeking to understand the presence of anxiety in children with ASD for a number of reasons. Given the developmental impairments, parents are likely to have greater involvement with their children (as compared to parents of typically developing children), and in the context of a chronic disability, parent support can often continue in some form throughout the life of an individual with ASD (Myers & Johnson, 2007; National Research Council, 2001; Reaven, 2011). In addition there is evidence parents can play a key role in supporting autism interventions, which have been found to be most successful when integrated and embedded into family life (Williams et al., 2014b).

Furthermore, parents of children with ASD experience higher levels of emotional distress, including anxiety, as compared to parents of typically developing children and children with other developmental disabilities (Estes et al., 2009; Karst & Van Hecke, 2012), which may impact on parenting behaviours. A number of factors have been found to contribute to higher levels of stress and anxiety in parents of children with ASD, including a child's externalising behaviour and internalised distress (Karst & Van Hecke, 2012). Theoretical models of child anxiety suggest parent anxiety may increase a child's vulnerability to the development of anxiety through anxiety-enhancing parent

behaviours such as allowing avoidance of feared situations and modeling caution or catastrophising (Ginsburg & Schlossberg, 2002; Hudson & Rapee, 2004); however evidence to date has been mixed (de Vente, Majdandzic, Colonnesi, & Bogels, 2011; Gar & Hudson, 2008). Despite the inconsistencies in these findings, the importance of understanding parent-child interaction in ASD and its potential role in relation to child anxiety is clear.

Investigating causal and maintaining factors of anxiety in children with ASD

This thesis aims to further our understanding of the causal and maintaining factors of anxiety in children with ASD, including whether these factors are the same or similar to those found in typically developing children with anxiety. The focus of this thesis is on two such factors that have been shown to be associated with child anxiety. Firstly, the parent-child relationship and in particular parental overinvolvement, parental negativity and an associated cognitive mechanism, parental fear of negative child evaluation (FNCE). The second focus of this thesis is to examine the presence of child cognitive bias, specifically an interpretation bias towards threat, and its association with anxiety in ASD. In order to compare and contrast factors associated with anxiety in both ASD and typically developing children, the childhood anxiety literature will first be reviewed.

Anxiety in typically developing children

Anxiety disorders are the most common psychological problem among children and adolescents with approximately 5% of children meeting criteria for an anxiety disorder at any given time (Rapee, Schniering, & Hudson, 2009), and almost 10% of children experiencing clinical anxiety before the age of 16 (Costello et al., 2003). In addition to a strong genetic influence associated with childhood anxiety (Hettema, Neale, & Kendler, 2001), factors related to the family environment, and in particular

parent-child interactions, also play an important role (Rapee, 2012). Aetiological models of childhood anxiety emphasise the importance of the parent-child relationship as a factor in the development and maintenance of anxiety (Chorpita & Barlow, 1998; Hudson & Rapee, 2004; Ollendick & Benoit, 2012), with theories (Ginsburg & Schlossberg, 2002; Rapee, 2001) and more recent research suggesting it is likely to be a bi-directional relationship (Hudson & Dodd, 2012; Hudson, Doyle, & Gar, 2009; Williams, Kertz, & Woodruff-Borden, 2012).

Parenting factors. Widespread research on parent-child factors associated with anxiety has generally focused on two broad parenting dimensions - parental control and parental rejection. Parental control refers to the use of excessive caution and/or restrictive child-rearing behaviours including overinvolvement, overprotection and lack of autonomy granting (Ginsburg & Schlossberg, 2002; Wei & Kendall, 2014); while parental rejection includes negativity, criticism and lack of warmth/acceptance.

Parental control. There is a large body of evidence indicating a relationship between parental control and childhood anxiety (Drake & Ginsburg, 2012; McLeod, Wood, & Weisz, 2007; Rapee, 2012; Wei & Kendall, 2014; Wood, McLeod, Sigman, Hwang, & Chu, 2003). It has been suggested parental over-control may lead to the development of anxiety by reducing a child's perception of control and mastery over their environment (Chorpita & Barlow, 1998). For example, restricting a child's ability to experience developmentally appropriate boundaries and engage in self-help behaviours can result in a less developed sense of self-efficacy, leading to increased dependence on parents (Wood et al., 2003). It can also lead to a child's over-reliance on parents to help regulate their emotions and can interfere with extinction of a child's fear response by reducing opportunities to face fears (McLeod, Wood, & Avny, 2011).

More recent research has indicated the relationship between parental control and childhood anxiety is likely to be reciprocal. For example, Hudson and Dodd (2012) found maternal over-involvement was a significant predictor of child anxiety in preschool-aged children, when reassessed five years later. Edwards, Rapee, and Kennedy (2010) found a similar, but bi-directional result in a longitudinal study based on preschool children. They found over time, parental overprotection predicted child anxiety symptoms, *and* child anxiety predicted maternal overprotection when reassessed 12 months later.

Despite theoretical models identifying parenting behaviour as an important factor in the development and maintenance of childhood anxiety, and a large body of supporting evidence, when looking broadly at the association between parental control and anxiety only small to moderate effect sizes have been found. For example, a meta-analysis based on 23 studies conducted by van der Bruggen, Stams, and Bogels (2008) found a moderate association between parental control and child anxiety, and a review conducted by McLeod et al. (2007) found parental control accounted for only 6% of the variance in child anxiety. Some researchers have argued the relatively small variance accounted for by parental control may relate to a lack of specificity with respect to the conceptualisation of parenting behaviours. In other words, the construct of control may be too broad, and to determine actual effect of parenting behaviours requires more precisely defined mechanisms and parent behaviours (McLeod et al., 2011). In a move towards greater specificity, studies have examined a subset of parental control - over-involvement (e.g. Hudson & Rapee, 2001), and a very similar concept, intrusiveness (e.g. Wood, McLeod, Piacentini, & Sigman, 2009b), finding evidence of a significant association with child anxiety.

Furthermore, while small to moderate effect sizes have been found, it has been suggested the way in which constructs are measured can affect the strength of association – with studies employing observational designs demonstrating a stronger relationship between parental control and child anxiety (McLeod et al., 2007). A number of observational studies have been utilised to study the construct of overinvolvement and include a tangram task (Hudson & Rapee, 2001) and a Five Minute Speech Sample (FMSS) task (Magana et al., 1986). The tangram puzzle task provides a measure of parental overinvolvement based on parent intervention during a child's puzzle task, while the parent's FMSS task (during which they speak about their child) is coded for evidence of emotional overinvolvement.

*Parental overinvolvement and ASD***.** While the relationship between parenting behaviour and child anxiety in ASD has not been the focus of empirical study to date, Reaven (2011) conceptualises the interaction between the deficits of ASD and parenting behaviour in terms of adaptive protection and excessive protection. Adaptive protection is considered to be functional parenting behaviour in response to the child's developmental, physical and emotional challenges. In other words, providing the level of support required for the child to experience success in a demanding environment. This is a similar concept to parental responsiveness which is an adaptive, developmentally appropriate parenting response to a child's needs (Maccoby, 1992).

In contrast to adaptive protection, excessive protection is akin to the concept of overinvolvement or overprotection in typically developing children with anxiety. According to Reaven (2011), excessive protection involves stepping in and limiting a child's exposure to anxiety provoking situations, even though the child has the skills to cope. This theory remains to be empirically tested, however the idea of adaptive and excessive protection provides a useful framework to conceptualise the nature of

parental involvement in children with ASD and suggests it may be more complicated than that seen in typically developing children.

Parental negativity. Parental negativity is also hypothesised to be associated with child anxiety, although evidence of this relationship is inconsistent (Rapee, 2012; Wei & Kendall, 2014; Wood et al., 2003). Parental negativity, and the subsequent negative environment, is thought to influence anxiety by increasing negative beliefs and attributions that may lead to the perception of the environment as threatening, as well as impacting a child's emotion regulation and sense of self-worth (Bogels & Brechman-Toussaint, 2006; Wei & Kendall, 2014).

A number of studies have found evidence of an association between parental rejection and/or criticism and increased child anxiety (Gar & Hudson, 2008; Hudson & Rapee, 2001; Moore, Whaley, & Sigman, 2004). For example Gar and Hudson found mothers of anxious children were more critical towards their children than mothers of nonanxious children, and using an observational design Hudson and Rapee (2001) found mothers of anxious children were more negative during interactions with their child. However other studies have failed to find evidence of a relationship between child anxiety and parental rejection (Beesdo, Pine, Lieb, & Wittchen, 2010; van Gastel, Legerstee, & Ferdinand, 2009). Furthermore there is some evidence of a stronger relationship between parental negativity and depression (Beesdo et al., 2010; McLeod et al., 2007; Rapee, 1997). Despite inconsistencies in the findings, there is enough evidence to support an association between parental negativity and anxiety (Wei & Kendall, 2014), and further exploration of this concept in children with ASD and anxiety is justified.

Fear of negative child evaluation (FNCE). The construct of parental FNCE has emerged recently in the childhood anxiety literature as a potential mediator in the

association between parental and child social anxiety and has also been found to be associated with overinvolvement (de Vente et al., 2011; Schreier & Heinrichs, 2010). FNCE refers to a specific parental fear that their child will be evaluated negatively by others, and may be influenced by a parent's own fear of negative evaluation and a consequent belief that their child's behaviour is a reflection of their parenting. It is suggested parental FNCE may affect a child's anxiety through modelling and reinforcement of avoidant behaviour (de Vente et al., 2011). Schreier and Heinrichs (2010) found parental FNCE predicted child social anxiety, and maternal FNCE was found to be a mediator in the relationship between maternal and child social anxiety. de Vente et al. (2011) found FNCE was a partial mediator in the relationship between parental anxiety and overinvolvement, suggesting parents may be motivated to intervene and become overly involved in response to concerns regarding the impression their child makes on others.

Given the increased likelihood of problem behaviours and distress in children with ASD and anxiety (Davis et al., 2011; Evans et al., 2005; White et al., 2009), as well as parental stress and anxiety (Estes et al., 2009; Karst & Van Hecke, 2012), there is potential for FNCE to also play a role in relation to child anxiety and parent behaviour in ASD. Furthermore, the stigma some parents of children with ASD report (Werner & Shulman, 2015) may contribute to worry about negative evaluation by others, suggesting FNCE may be an important cognitive mechanism influencing parental behaviour in ASD and warrants empirical attention.

Child cognitive factors. In addition to the parent-child relationship factors outlined above, child cognitive factors have received considerable attention in the child anxiety literature, as cognitive bias is a fundamental mechanism of cognitive models of anxiety (Beck & Clark, 1997; Muris & Field, 2008). In particular, interpretation bias

towards threat has been consistently demonstrated in people with anxiety (Hadwin, Garner, & Perez-Olivas, 2006). According to cognitive models, this evaluation of stimuli as 'dangerous' elicits the anxiety emotion which manifests in both physiological and behavioural symptoms (Muris & Field, 2008).

Studies based on the interpretation of ambiguous situations have found children with anxiety are more likely to interpret situations as threatening, compared to non-anxious controls (Barrett, Rapee, Dadds, & Ryan, 1996; Bogels & Zigterman, 2000; Creswell, Schniering, & Rapee, 2005; Muris, Rapee, Meesters, Shouten, & Geers, 2003). Further evidence of the presence of interpretation bias in anxious children has been found in studies using homographs where anxious children were more likely to select a threatening meaning (Hadwin, Frost, French, & Richards, 1997; Taghavi, Moradi, Neshat-Doost, Yule, & Dalgleish, 2000); and a recent study using a computerised performance-based measure to assess interpretation bias again found child anxiety was associated with a bias towards threat (Rozenman, Amir, & Weersing, 2014). There is preliminary evidence of a possible bias associated with the interpretation of emotions in ASD, with one finding suggesting children with ASD were more likely to perceive neutral faces as negative (Kuusikko et al., 2009). However there was no indication in this study as to the presence/absence of anxiety for the participants.

According to cognitive models of anxiety (Clark & Beck, 2010), cognitive bias is considered to play a central role in the maintenance of anxiety through selective processing of threat information which interferes with the processing of non-threat information. As a result, over time negative automatic thoughts dominate, which in turn maintains the anxiety. However, the majority of research supporting this has been cross-sectional so there is limited understanding as to how cognitive biases develop in children and the role they may play in the development of anxiety (Muris & Field, 2008).

There is some evidence that interpretation bias predicts anxiety symptoms over time, however results are as yet inconclusive (Dodd, Hudson, Morris, & Wise, 2012).

Despite increasing research on the nature of anxiety in children with ASD, very few studies have looked at cognitive correlates between anxiety in typically developing children and anxiety in ASD. While negative cognitions are evident in children with ASD and anxiety (Farrugia & Hudson, 2006), there has to date been no research on interpretation bias associated with anxiety in ASD. Given the social cognitive impairment inherent in ASD, a further understanding of cognitive processes associated with anxiety and whether they are altered by the presence of ASD is warranted.

Theory of Mind in ASD. In considering potential child cognitive factors in ASD and anxiety it is important to examine a prominent cognitive theory in the ASD literature. It has been suggested a deficit in Theory of Mind (ToM) may be a core neuropsychological pathway underlying ASD (Baron-Cohen, 1997; Frith, 2001). ToM refers to an impaired ability to infer the mental states of others – i.e. another person's thoughts, beliefs and emotions, and widespread evidence suggests people with ASD have varying degrees of ToM impairment (Frith). The development of ToM is related to a number of precursor skills including joint attention and emotion recognition; and in turn ToM affects social and communication skills and as such is thought to be one of the central impairments associated with ASD (Fletcher-Watson, McConnell, Manola, & McConachie, 2014). It is feasible deficits in social cognition, including theory of mind may impact appraisal and interpretation of social information, which is further reason to consider the potential impact of ASD-related cognition on anxiety.

The present research

As outlined, there is an emerging, but incomplete, knowledge of the nature of co-morbid anxiety and ASD. In particular, limited research has looked at the causal and

maintaining factors of anxiety in this population. This thesis presents three studies, utilising the same sample throughout, based on an experimental design, with the aim of furthering our understanding of the nature of anxiety in children with ASD; in particular to examine the similarity in causal and maintaining factors of anxiety between children with ASD and typically developing children. The sample comprised children with ASD and anxiety, typically developing children with anxiety and non-anxious controls. Ideally the sample would have included a group of children with ASD only, however the researchers did not have access to this group and therefore it was not possible discriminate between factors associated with ASD only, as compared to ASD and comorbid anxiety.

The first study is presented in Chapter 2 and the aim was to examine parent-child interactions in children with ASD and anxiety as compared to typically developing children with anxiety and non-anxious controls. Child/parent dyads participated in a task together that involved the child completing a tangram puzzle while the parent watched on. Parent behaviour was coded for the level of involvement and negativity. In a separate task parents were asked to complete the Five Minute Speech Sample (FMSS) which involved speaking about their child for 5 minutes. The parent's speech was then coded for emotional overinvolvement and criticism. It was expected parents of anxious children (both ASD and non-ASD) would demonstrate greater levels of parental involvement and negativity than parents of non-clinical children. It was also expected that further comparison between parents of ASD and non-ASD children would show parents of children with ASD would demonstrate significantly higher levels of involvement.

The second study is presented in Chapter 3. The aim of this study was to examine the relationship between parental fear of negative child evaluation (FNCE) and

parental overinvolvement, and to explore parent-reported reasons for involvement. Parents completed a questionnaire measure of FNCE. The tangram puzzle task and coding from the first study was used to provide the measure of involvement. On completion of the tangram task, parents were also asked to review a video recording of the task and comment on what they were thinking as they sat with their child to complete the task. It was predicted that parents of anxious children would have higher levels of FNCE than parents of non-anxious children, and that parents of children with ASD and anxiety would have higher levels again. It was also expected FNCE would mediate the relationship between parent anxiety and parent involvement. In exploring parent reasons for involvement it was expected parents may intervene to reduce their child's distress and acting out behaviours.

The third study is presented in Chapter 4. This study examined interpretation bias towards threat in children with ASD and comorbid anxiety. Children were presented with a series of ambiguous situations and asked to report their hypothetical cognitions and behaviours in response to the situation. Their responses were then coded as threatening or non-threatening and their solutions as prosocial or avoidant It was expected children with ASD and anxiety would demonstrate similar levels of threat interpretation to typically developing children with anxiety, and identify a similar number of avoidant solutions.

The final chapter provides a discussion of the findings of the three studies and outlines the implications of the findings in relation to furthering our understanding of the nature of anxiety in children with ASD. Strengths and limitations of the present research are also noted as well as directions for future research.

Chapter 2

Parent-child interaction in children with autism spectrum disorder and anxiety disorders

Abstract

Past research has identified a relationship between child anxiety and parental overinvolvement and negativity in typically developing children. This study examined parent-child interactions in children with autism spectrum disorder (ASD) and comorbid anxiety. The sample consisted of children with anxiety disorders (n = 20), children with ASD and anxiety (n = 19), and non-clinical children (n = 18). Parental involvement and negativity were assessed during a tangram task and Five Minute Speech Sample (FMSS). Parents of children with ASD and anxiety showed higher levels of involvement than parents of anxious children, and both clinical groups were more involved than the non-clinical group. No difference in parental negativity was found. These results are discussed in relation to the interaction between ASD symptoms, anxiety and parental behaviour.

Parent-child interaction in children with autism spectrum disorder and anxiety disorders

The current body of empirical literature reflects an emerging but incomplete knowledge of the nature of anxiety in children with autism spectrum disorder (ASD), however is is clear anxiety symptoms commonly co-occur with ASD and can cause impairment beyond the symptoms of ASD alone (White et al., 2009; Wood & Gadow, 2010). Difficulties associated with diagnostic overshadowing and symptom overlap (Hagopian & Jennett, 2014), as well as atypical presentations of anxiety (Kerns & Kendall, 2012), have raised questions as to the extent to which anxiety is a comorbid disorder, a manifestation of ASD or a variant of anxiety altered by ASD processes. While tentative, a number of reviews have concluded anxiety does exist as a comorbid disorder in children with ASD given similarities in presentation, symptoms, developmental course and response to treatment of anxiety symptoms across both children with ASD and typically developing children (Kerns & Kendall, 2012; Wood & Gadow, 2010). However atypical presentations are also evident (Kerns et al., 2014).

Prevalence rates of comorbid anxiety have varied widely across the literature, with 11- 84% of children with ASD identified as experiencing some degree of anxiety that causes impairment (White et al., 2009). This variability is likely to be the result of differences in the way in which anxiety has been operationalised and assessed, as well as variations in sample selection and size. In studies based on a diagnosed anxiety disorder (rather than the presence of anxiety symptoms), Simonoff et al. (2008) found almost 42% of children with ASD met criteria for an anxiety disorder, and de Bruin, Ferdinand, Meester, de Nijs, and Verheij (2006) found 55% of children with pervasive developmental disorder not otherwise specified (PDD-NOS) met criteria for one or more

anxiety disorders. Using an anxiety assessment measure validated for children with ASD, Leyfer et al. (2006) found 44% of children with ASD had at least one comorbid anxiety disorder. In studies based on community samples (rather than treatment-seeking groups), the reported prevalence range is 11-42% (Kerns & Kendall, 2012). Regardless of the variability, it is clear anxiety is more common in children with ASD than typically developing children (Costello et al., 2003; Rapee et al., 2009).

Kerns and Kendall (2012) suggest the higher incidence and unusual features of anxiety found in some children with ASD may provide evidence of an atypical presentation of anxiety. For example, children with ASD can present with social anxiety but lack a specific fear of social evaluation (Leyfer et al., 2006). Also, the presentation of OCD in children with ASD can occur without prior distress associated with compulsions (Muris et al., 1998). It seems likely these atypical presentations result from the interaction of anxiety with core ASD features (White et al., 2009). In this case, the social cognition deficits and repetitive behaviours inherent to ASD are likely to overlap with and impact the symptoms of social anxiety and OCD respectively. Further interaction between ASD and anxiety is evident in behavioural responses.

Anxiety is more likely to be associated with acting out behaviours in children with ASD as compared to non-ASD children (White et al., 2009). In a cross-sectional study of children and adults with ASD, Davis et al. (2011) found that the presentation of anxiety symptoms followed a similar developmental course to that seen in typically developing children but at a slower pace, which the authors suggest may be related to delayed development of the ability to regulate and inhibit anxious responses. This was evidenced by greater levels of distress in response to anxiety in children with ASD. In addition to potential difficulties with emotional regulation, Kim et al. (2000) found that ASD children with anxiety and mood problems were more likely to present with

challenging behaviour than ASD children without symptoms of anxiety and depression. Similarly, Farrugia and Hudson (2006) found a significant positive correlation between anxiety and disruptive behaviour in adolescents with Asperger syndrome; and further, Storch et al. (2012) found 41% of children with ASD and anxiety also met criteria for a co-occuring disruptive behaviour disorder (DBD) - i.e. oppositional defiant disorder and conduct disorder - (Storch et al.). Clinical experience suggests children with ASD may be more likely to use externalising behaviour to avoid anxious situations, and negative reinforcement of this behaviour (i.e., allowing children to avoid the situation) can maintain this response and may lead to the development of DBD (Storch et al.). Furthermore, if parents allow or facilitate avoidance of anxiety-provoking situations this is likely to maintain the anxiety.

In their treatment program for children with ASD and anxiety, (Reaven & Hepburn, 2006) address parental influence on a child's avoidant behaviour. They conceptualise the interaction between parental involvement, the deficits of ASD and anxiety in terms of excessive protection and adaptive protection. Excessive protection is defined as limiting the child's exposure to challenging situations, even though the child has the skills to cope. In contrast, adaptive protection is considered to be functional parenting behaviour in response to the child's developmental, physical and emotional challenges. In other words, providing the appropriate level of support in, and exposure to, challenging situations to allow a child to develop and experience success. While intuitive and based on research in typically developing children, parent involvement or protection in ASD and anxiety remains to be empirically investigated.

While there is a lack of research examining parent-child interactions in ASD and anxiety, widespread research over the past two decades has looked at the relationship between parenting factors and childhood anxiety in typically developing children.

Aetiological models of anxiety emphasise the importance of the parent-child relationship in the development and maintenance of childhood anxiety (Chorpita & Barlow, 1998; Hudson & Rapee, 2004; Ollendick & Benoit, 2012). Research on parenting factors has generally focused on two broad dimensions – control and rejection. Parental control is a broad construct that includes the sub-dimensions of over-protection, overinvolvement and lack of autonomy granting. Parental rejection includes criticism, lack of parental acceptance/warmth and negativity.

Despite some variability in results, a wealth of empirical research has demonstrated a relationship between parental control and childhood anxiety (Drake & Ginsburg, 2012; McLeod et al., 2007; Rapee, 2012; Wei & Kendall, 2014; Wood et al., 2003), and more specifically overinvolvement and anxiety (Gar & Hudson, 2008; Hudson & Rapee, 2001). Theoretical models hypothesise that parents may intervene and become overinvolved in an effort to reduce or prevent their child's distress (Hudson & Rapee, 2004). Parental overinvolvement may lead to the development of anxiety by reducing a child's ability to engage in developmentally appropriate self-help behaviours which can result in a less developed sense of control, mastery and autonomy and an increased dependence on parents (Wood et al., 2003).

A number of models of anxiety suggest a reciprocal relationship exists whereby a child's anxious behaviour can also elicit parental overinvolvement (Hudson & Rapee, 2004). The recent emergence of longitudinal studies supports this reciprocal relationship between parent overinvolvement and child anxiety, with parental overinvolvement predicting later development of anxiety, and anxiety predicting future overinvolvement (Hudson & Dodd, 2012; Rapee, 2012). Research utilising experimental design has also provided support, finding a child's anxious behaviour influenced the level of maternal involvement (Hudson et al., 2009).

With respect to parental negativity/rejection, there have been inconsistent findings regarding the relationship between parental rejection and child anxiety (Wei & Kendall, 2014; Wood et al., 2003). Some studies have found an association between parental rejection/negativity and anxiety (Gar & Hudson, 2008; Moore et al., 2004), while others have not (Beesdo et al., 2010; van Gastel et al., 2009). There is also some evidence of a stronger relationship between parental rejection/negativity and childhood depression (Beesdo et al., 2010; McLeod et al., 2007; Rapee, 1997). Despite conflicting results, there is enough evidence to support an association between parental rejection/lack of warmth and anxiety (Wei & Kendall, 2014), and warrant further exploration.

To date, very few studies have compared parent-child interaction (specifically overinvolvement and negativity) between anxious populations and other forms of psychopathology (Rapee, 2012). Among studies that have, results indicate a possible lack of specificity, as some parenting behaviours may be associated with a number of different types of psychopathology (Rapee, 1997). For example, higher levels of parental overinvolvement and negativity were found to be associated with both oppositional defiant children, and children who were clinically anxious (Hudson & Rapee, 2001). Research is also lacking in relation to parent-child interaction in children with comorbidity, such as ASD and anxiety.

Despite limited empirical evidence of causal and maintaining factors for anxiety in ASD, anxiety treatment programs for children with ASD have achieved promising results (Chalfant, Rapee, & Carroll, 2007; Moree & Davis, 2010; Reaven et al., 2009; Wood et al., 2009), and have generally been based on the assumption that the same factors are involved in the development and maintenance of anxiety in both ASD and in typically developing children. While the success of these CBT-based anxiety programs

for children with ASD does not in itself provide evidence of the same underlying aetiology, it does however lend some support to the presence of similar maintaining factors, including anxiety-enhancing parenting behaviours.

The aim of this study was to investigate parenting behaviours (specifically overinvolvement and negativity) in relation to children with ASD and comorbid anxiety. It was hypothesised that the clinical groups (ASD-anxious and anxious) would be higher in parental involvement and negativity than the non-clinical group. It was also hypothesised that parental involvement would be higher in the ASD-anxious group as compared to the anxious group as a result of the increased likelihood of emotional regulation difficulties and challenging behaviours in response to anxiety.

Method

Participants

The sample consisted of 57 child/parent dyads (19 children with a diagnosis of ASD and anxiety, 20 with anxiety disorders only and 18 non-clinical children). The children were aged 7 to 12 years, with a mean age of 9.3 years (*SD* = 1.5). The parent self-identified as the primary caregiver and the sample consisted of 53 mothers and 4 fathers, with 1 father in each of the ASD-anxious and non-clinical groups, and 2 fathers in the anxious group.

Children in the anxious sample were recruited from families who attended the Macquarie University Emotional Health Clinic in Sydney, Australia, for assessment and treatment for childhood anxiety. Children were assessed by postgraduate students in clinical psychology using the Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Version (ADIS-C/P; Silverman & Albano, 1996), therefore diagnoses were made in accordance with DSM-IV (American Psychiatric Association, 2000) and as such Obsessive-Compulsive Disorder and Posttraumatic Stress Disorder were considered as

anxiety disorders. To be eligible to participate in the study, children in the anxious group were required to meet criteria for one or more anxiety disorders as their primary diagnosis.

The children with ASD were recruited via two sources. Fifteen dyads were families who were also attending the Emotional Health Clinic for assessment and treatment of comorbid anxiety, and four dyads were recruited through advertisements placed with local ASD service providers and an online advertisement through Autism Spectrum Australia's website (Aspect). All children had a documented diagnosis of either Asperger's disorder (7 children), autistic disorder/autism spectrum disorder (10 children) or PDD-NOS (2 children), and had been diagnosed by a paediatrician or clinical/developmental psychologist prior to enrolment in the study. Children in the ASD-anxious group were also required to meet criteria for one or more anxiety disorders, and anxiety status was assessed over the telephone or in person using the Anxiety Disorders Interview Schedule for DSM-IV: Parent Version (ADIS-P; Silverman & Albano, 1996). Telephone administration of the ADIS-P has been shown to be a valid method of determining anxiety disorders, comparable to separate face-to-face interviews with child and parent (Lyneham & Rapee, 2005). Children in any of the three groups who scored 2 standard deviations below the mean on IQ subtests were excluded from the study, which resulted in the exclusion of 2 dyads from the ASD-anxious group.

The percentage frequencies of primary anxiety disorders across the ASD-anxious and anxious groups are presented in Table 1. Eighty-five percent of children in the anxious group were diagnosed with more than one anxiety disorder, and 74% in the ASD-anxious group. Twenty percent of children in the anxious group and 32% in the ASD-anxious group also met criteria for ADHD (based on prior diagnosis).

Table 1

Percentage frequencies of anxiety disorders (participant numbers appear in parentheses) across the ASD-anxious and anxious groups

	ASD-anxious (n = 19)	Anxious (n = 20)
Generalised anxiety disorder	58 (11)	45 (9)
Social anxiety disorder	21 (4)	30 (6)
Separation anxiety disorder	11 (2)	10 (2)
Specific phobia	5 (1)	5 (1)
Obsessive compulsive disorder	5 (1)	5 (1)
Panic disorder	0	5 (1)

Note. ASD = autism spectrum disorder.

The non-clinical children were recruited from the community via an advertisement distributed through local public school newsletters. The advertisement requested confident children who had never sought help from a mental health professional, and for inclusion in the study children were required to have low levels of symptoms. Children were assessed for anxiety over the telephone using the Anxiety Disorders Interview Schedule for DSM-IV: Parent Version (ADIS-P; Silverman & Albano, 1996) and were included in the non-clinical sample if they did not meet criteria for an anxiety disorder. Non-clinical families scoring 2 standard deviations above the mean on any study measures were excluded to ensure a non-clinical group. As a result 2 dyads were excluded from the study. The non-clinic referred families were given $100 for participating in the study.

Tasks

Task 1: Five Minute Speech Sample (FMSS). The parent was seated in a room with the researcher and asked to complete the FMSS which is a measure of expressed emotion (EE) developed by (Magana et al., 1986). They were given the following instructions: "I'd like to hear your thoughts and feelings about (child's name) in your own words and without my interrupting with any questions or comments. When I ask you to begin, I'd like you to speak for 5 minutes, telling me what kind of person (child's name) is and how the two of you get along together. After you begin to speak, I prefer not to answer any questions until after the 5 minutes." The speech samples were audio recorded or videotaped.

Task 2: Tangram task. The parent and child were seated at a table and asked to complete a difficult tangram puzzle in a 5-minute period. The observational task provides a measure of parental involvement and negativity and was developed by (Hudson & Rapee, 2001). The child was given a set of geometric pieces and asked to put them together to complete a picture presented on a card. The task was designed to be too difficult to complete within the 5 minutes. The following instructions were given to the parent: "This is a test of your child's ability. We want to see how good he/she is at thinking. Mum/Dad, you are going to sit there for support and you will have the answers for interest. Most kids can do it but some find it a bit hard to get going. You can help if you think he/she really needs it." The parent was given the answer card to ensure the level of assistance they provided was not limited by their own skill. Once the instructions were read the researcher left the room for 5 minutes, and the task was videotaped.

Parent behaviour measures

Observation. Task 1: Five Minute Speech Sample (FMSS). Two measures of expressed emotion (EE) - emotional overinvolvement (EOI) and criticism (CRIT) - were coded from the FMSS based on the method described by (Magana-Amato, 1990). Presence of EOI was coded based on observed self-sacrificing/overprotective behaviour or emotional display during the interview. If neither of these were observed during the interview, EOI was still coded as present if two or more of the following statements were made: (i) excessive detail about the past, (ii) one or more statements of attitude or (iii) five or more positive remarks (excessive praise). Borderline-EOI was coded if moderate evidence was present.

A rating of CRIT was given if any of the following were observed: (i) a negative initial statement about the child, (ii) evidence of a negative relationship or (iii) one or more critical statements. Borderline-CRIT was coded if dissatisfaction was evident. When the FMSS is used with populations who may be reluctant to speak strongly about their relative (such as parents of young children), the manual indicates it may be appropriate to include borderline cases in the full category. Therefore borderline-EOI and borderline-CRIT cases were included in the EOI and CRIT categories respectively in this study.

The speech samples were transcribed from audio or video and coded. One coder was trained and certified as an FMSS coder by Sybil Zaden of U.C.L.A., where the measure was developed. This coder trained a second coder (primary coder) to a standard of greater than 80% agreement across all ratings. Twenty-five percent of speech samples were randomly selected and coded by the additional coder. Inter-rater

agreement for the EOI and CRIT categories were good to very good, with kappa values as follows: EOI, $k = 0.74$; CRIT, $k = 0.86$.

Observation. Task 2: Tangram task. The 5 minute parent and child tangram task was coded using the tangram coding manual developed by (Hudson & Rapee, 2001). The parent-child interactions were coded on nine global scales, which were combined to create the involvement and negativity factors. The involvement factor assessed the overall degree of help the parent gave and was calculated as the mean score of the following five scales: (i) general degree of parent's involvement, (ii) unsolicited help, (iii) degree of parent touching of tangram pieces, (iv) parent's position, and (v) parent's focus during the task.

The negativity factor assessed parental warmth during the interaction and was calculated as the mean score of the following four scales: (i) general mood of the interaction, (ii) parent's degree of positive affect, (iii) parent's tension, and (iv) degree of positivity and encouragement towards the child. Each scale was rated on a nine-point continuum from 0-8, with ratings of 0-3 used to code less involved/more positive interactions and ratings of 5-8 used for more involved/more negative interactions.

Coders were postgraduate clinical psychology students who were trained in the use of the coding system until 80% agreement was reached between coders. Two primary coders who were unaware of the diagnostic status of the child coded 100% of interactions between them. Forty percent of interactions were double coded by the first author to assess inter-rater reliability. Intraclass correlations were calculated to assess coding reliability, with inter-rater reliability for the involvement factor found to be very high, $ICC(2,1) = 0.91$, $p < 0.01$, while reliability for the negativity factor was slightly lower, $ICC(2,1) = 0.81$, $p < 0.01$.

Cognitive assessment

The Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) is an individually administered measure for assessing cognitive ability, and was used to ensure groups did not differ based on cognitive ability. The WISC-IV consists of 10 core subtests that combine to give four composite index scores and a full scale IQ score (Wechsler, 2003a). Four of the 10 subtests were administered (Vocabulary, Similarities, Block Design and Matrix Reasoning) to provide an assessment of verbal comprehension and perceptual reasoning. The WISC-IV has demonstrated good reliability and validity based on a normative sample of 2,200 children, with internal consistency values of .89 for both Vocabulary and Matrix Reasoning, and .86 for Similarities and Block Design (Wechsler, 2003b).

Symptom measures

Additional questionnaires were completed to provide further support for the distinction between the clinical and non-clinical groups. Symptoms of child anxiety were measured using the Spence Children's Anxiety Scale – Parent Report (SCAS-P; Spence, 1999). The SCAS-P is a 38-item questionnaire that provides an overall measure of child anxiety, as well as six anxiety subscales corresponding to DSM-IV disorders. The response to each item is based on a 4-point scale from 0 (never) to 3 (always). The SCAS-P has demonstrated good internal consistency for the total scale score, and was found to be effective in discriminating clinical and non-clinical children (Nauta et al., 2004). In the current study the SCAS-P had excellent internal consistency with a total scale Cronbach's alpha of 0.95.

Parents completed the Autism Spectrum Rating Scales Short Form (ASRS-SF; Goldstein & Naglieri, 2010) to provide further distinction between the ASD group and anxious and non-clinical groups. The ASRS-SF consists of 15 items and was developed

by selecting items from the full-length ASRS (71 items) that best differentiate children with and without ASD. Respondents provide a rating for each item based on how often the child exhibited a behaviour during the past four weeks using a 5-point scale from 0 (never) to 4 (very frequently). The ASRS-SF has demonstrated high levels of internal consistency and discriminant validity in differentiating individuals with ASD from non-clinical or other clinical group members (Goldstein & Naglieri, 2010). The ASRS-SF also demonstrated excellent internal consistency in the current study with a Cronbach's alpha of 0.94.

Parents completed a self-report questionnaire to provide a measure of their own emotional health symptoms, the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). The DASS-21 consists of 21 items that comprise three subscale measures of depression, anxiety and stress. Each subscale consists of seven items and participants respond on a 4-point scale from 0 (did not apply to me at all over the past week) to 3 (applied to me very much, or most of the time over the past week). The DASS-21 has demonstrated good internal consistency and concurrent validity (Antony, Bieling, Cox, Enns, & Swinson, 1998). In this study the total scale score for the DASS-21 demonstrated excellent internal consistency with a Cronbach's alpha of 0.91.

Procedure

Prior to participating in the experiment, parents signed a consent form on behalf of themselves and their child, and children gave verbal consent to participate. Following initial introductions, children left the room and the parent completed the FMSS task with the researcher. The child then completed the WISC-IV subtests with the researcher, while the parent completed questionnaires in another room. During this time parents also completed self-report questionnaires for an additional study (see Chapter 3 and 4). Once the IQ tasks were completed the parent rejoined the child and

they were seated next to each other. The child was given the tangram task to complete while the researcher left the room. The FMSS and tangram tasks were both video-taped. The procedures in this study were approved by the Macquarie University Human Ethics Committee.

Results

Preliminary analyses

Demographics. There were no significant differences in age, gender, ethnic background, family income, family composition or IQ (as measured by the Vocabulary, Similarities, Block Design and Matrix Reasoning WISC-IV subtests) between the three groups (p's > 0.05; see Table 2).

Boys and girls did not differ in maternal involvement, $t(55) = -.38$, $p > 0.05$ and negativity, $t(55) = -.45$, $p > 0.05$. A significant negative relationship was found between parental involvement and children's age in the non-clinical group, $r = -.55$, $p < 0.05$, indicating less parental involvement with increasing child age. However parental involvement was not significantly related to age in the ASD-anxious group, $r = -.06$, $p > 0.05$ or the anxious group, $r = -.15$, $p > 0.05$. Parental negativity was not significantly related to age in either the ASD-anxious group, $r = .45$, $p > 0.05$, the anxious group, $r = .04$, $p > 0.05$ or the non-clinical group, $r = -.29$, $p > 0.05$.

Table 2

Demographic variables across groups

	ASD-anxious (n = 19)	Anxious (n = 20)	Non-clinical (n = 18)
Child's age (M)	9.0 (1.5)	9.4 (1.3)	9.7 (1.7)
Gender	12 boys	12 boys	10 boys
Ethnic background (%)			
Oceanian	63	60	56
European	37	35	33
Asian	0	5	11
Weekly family income (%)			
$1-1,599	10.5	20	33.3
$1,600-3,199	37	25	33.3
$3,200-5,199	37	25	33.3
$5,200 or more	10.5	30	0
Decline to answer	5	0	0
Family Composition (%)			
Two parent	79	90	83
Single parent	16	5	11
Step/Blended	5	5	6
WISC			
Vocabulary	10.6 (2.7)	11.5 (2.5)	12.0 (2.1)
Similarities	11.4 (2.5)	11.6 (2.4)	11.2 (2.3)
Block Design	12.0 (2.1)	11.0 (2.6)	11.1 (2.6)
Matrix Reasoning	12.3 (3.3)	11.3 (2.5)	12.4 (2.9)

Note. ASD = autism spectrum disorder. Family income is reported in Australian dollars. Standard deviations appear in parentheses.

Descriptive measures. One-way analyses of variance (ANOVA) and follow-up planned contrasts were carried out to compare anxiety and autism symptoms between the groups to confirm group status. The mean scores for the child and parent questionnaires are presented in Table 3. The groups differed significantly with respect to autism symptom scores on the ASRS, $F(2,54) = 44.00$, $p < 0.01$, and follow up tests revealed a significant difference between the ASD-anxious group and the other two groups, $t(54) = 8.96$, $p < 0.01$. The mean score for ASD-anxious group was in the elevated range, while both the means for the anxious and non-clinical groups were in the average range. A comparison of the SCAS-P results indicated a significant difference between groups, $F(2,54) = 48.6$, $p < 0.01$, with follow-up tests revealing a significant difference between the clinical and non-clinical groups, $t(54) = 9.86$, $p < 0.01$. Both the ASD-anxious and the anxious group scores on the SCAS-P were significantly higher than the non-clinical group. Similarly, a significant difference was found between groups with respect to parent's emotional health symptoms as measured by the DASS-21, with the Levene's test indicating unequal variance, so adjusted degrees of freedom are reported, $F(2,30) = 10.78$, $p < 0.01$, with both the ASD-anxious and anxious groups scoring significantly higher than the non-clinical group, $t(51) = 4.64$, $p < 0.01$.

Table 3

Means and standard deviations for parent report questionnaire measures across groups

	ASD-anxious (n = 19)	Anxious (n = 20)	Non-clinical (n = 18)
Questionnaire			
SCAS-P	38.4 (8.9)	38.2 (16.1)	6.6 (5.6)
DASS-21			
Total score	12.1 (9.0)	12.4 (8.0)	5.0 (3.2)
ASRS-SF (t-score)	69.5 (5.2)	52.8 (10.2)	44.6 (8.4)

Note. ASD = autism spectrum disorder. SCAS-P = Spence Children's Anxiety Scale–parent report. DASS-21 = Depression Anxiety Stress Scales. ASRS-SF = Autism Spectrum Rating Scales Short Form. Standard deviations appear in parentheses.

Comparison between groups on maternal involvement and negativity

One-way ANOVAs with two follow-up planned contrasts were carried out to compare maternal involvement and negativity between i) the clinical groups and the non-clinical group and ii) between the ASD-anxious and anxious groups. The three diagnostic groups differed significantly with respect to maternal involvement, $F(2,54) = 5.28$, $p < 0.01$. Follow-up planned contrasts revealed a significant difference between the non-clinical and clinical groups regarding involvement, $t(54) = 2.38$, $p < 0.05$, with a medium effect size, $r = 0.31$, indicating parents of clinical children were significantly more involved than parents of non-clinical children during the tangram task. There was also a significant difference between the anxious group and the ASD-anxious group regarding involvement, $t(54) = 2.25$, $p < 0.05$, with a medium-sized effect, $r = 0.29$, indicating parents of children with both ASD and anxiety were significantly more

involved than parents of children with anxiety only. There were no significant differences between the groups with respect to maternal negativity. Table 4 shows the means and standard deviations for parental involvement and negativity.

Table 4

Mean involvement and negativity scores on the tangram task

	ASD-anxious (n = 19)	Anxious (n = 20)	Non-clinical (n = 18)
Tangram task			
Involvement	5.5 (1.1)	4.6 (1.2)	4.2 (1.4)
Negativity	2.5 (.8)	2.6 (.9)	2.8 (1.2)

Note. ASD = autism spectrum disorder. Standard deviations appear in parentheses.

Comparison between groups on maternal emotional overinvolvement (EOI) and criticism (CRIT)

Table 5 shows frequencies of the EOI and CRIT categories (comprising borderline and high ratings) for each group. Differences between diagnostic groups were investigated using chi-squared tests comparing expressed emotion categories across the three groups. Results showed a significant difference between groups in rates of EOI, χ^2 (2, N = 57) = 6.02, $p < 0.05$. Follow-up comparisons revealed a significant difference between the non-clinical and clinical groups regarding EOI, χ^2 (1, N = 57) = 5.80, $p < 0.05$. The odds ratio was 4.5, indicating EOI was significantly higher in the clinical group as compared to the non-clinical group. There was no significant difference between the ASD-anxious group and the anxious group regarding EOI. There was no significant difference between groups in rates of CRIT, χ^2 (2, N = 57) = 3.36, p = 0.21.

Table 5

Frequencies of EOI and CRIT from the FMSS

	ASD-anxious (n = 19)	Anxious (n = 20)	Non-clinical (n = 18)
Borderline–high EOI (%)	52.6	60.0	22.2
Borderline–high CRIT (%)	31.6	50.0	22.2

Note. ASD = autism spectrum disorder. EOI = emotional overinvolvement. CRIT = criticism.

Discussion

The aim of this study was to investigate the nature of parent-child interactions, specifically overinvolvement and negativity, in children with comorbid ASD and anxiety, as compared to typically developing children with anxiety. As anticipated, parents of children with anxiety (both ASD and non-ASD) were significantly more involved than parents of children in the non-clinical group. In addition, comparison between the ASD-anxious and the anxious group showed that parents of children with both ASD and anxiety were significantly more involved than parents of children with anxiety alone. With regard to parental negativity, no differences were found between any of the three groups.

Involvement was measured across two tasks, and results from both the FMSS and tangram task showed higher levels of emotional involvement and higher levels of task-involvement respectively, for both the ASD-anxious and the anxious groups, as compared to the non-clinical group. These findings are consistent with the wealth of research demonstrating that parents of children with anxiety show higher levels of

parental involvement than parents of non-clinical children (Drake & Ginsburg, 2012; McLeod et al., 2007; Rapee, 2012; Wei & Kendall, 2014; Wood et al., 2003). The results of the current study indicate this relationship is also present for children with ASD and comorbid anxiety, which may suggest parental overinvolvement is present for children with anxiety regardless of the presence of comorbid disorders.

Alternatively, it is possible these results lend support to the idea of a lack of specificity in relation to parenting factors and the development of psychopathology (Rapee, 1997). In other words, parental overinvolvement is associated with both ASD and anxiety separately. Few studies have compared parenting factors in anxious children and other forms of psychopathology, however the concept of multifinality suggests the same parental behaviours may be risk factors for multiple psychopathologies (Wood et al., 2003). To test this, future research could incorporate a comparison group of children with ASD and no anxiety.

Interestingly, the results from both tasks showed parental involvement was significantly higher for ASD-anxious children as compared to the anxious group. One explanation for this finding is that atypical, or an ASD-specific variant of anxiety, was present in the ASD-anxiety group. In their reviews (Kerns & Kendall, 2012; Kerns et al., 2014) concluded that while anxiety does exist as a comorbid disorder to ASD, there is also evidence of atypical presentations of anxiety. It is possible ASD-specific anxiety elicits different parental responses, or different frequency/intensity of response than a typical presentation of anxiety.

Perhaps a more likely explanation for the higher levels of parental involvement in children with comorbid ASD and anxiety is that the interaction between anxiety and ASD-related symptoms influences parent behaviour. For example, the response to anxiety is more likely to manifest in acting out behaviours and increased distress in

children with ASD (Davis et al., 2011; Kim et al., 2000), and as a result parents may intervene more quickly and more frequently to avoid this. Potential embarrassment associated with the negative evaluation of their child's behaviour may further motivate increased intervention. In addition, parents may be accustomed to providing considerable forewarning, preparation and supports for their child (which are generally considered to be standard ASD interventions (Prior, Roberts, Rodger, & Williams, 2011)), however it is feasible these strategies could become overly intrusive over time and play a role in maintaining anxiety.

For parents of children with ASD and anxiety, it is clear the decision to intervene may be complicated by the presence of developmental difficulties and necessary adaptions in parental behaviour. Reaven and Hepburn (2006) make a distinction between adaptive protection and excessive protection, where adaptive protection, or intervention, involves scaffolding to support the child in mastering challenging situations. In contrast, excessive protection involves limiting the child's exposure to challenging situations even though they have the skills to cope. In practice, the distinction between required and excessive intervention can be difficult for parents to make and may result in higher levels of involvement than necessary.

In the current study it was not possible to discriminate between adaptive and excessive involvement, and it is quite possible the observational measures of parental involvement picked up instances of what could be considered adaptive parental intervention. However, it is unlikely this accounts entirely for the observed overinvolvement in the ASD-anxious group, as there was no difference in cognitive ability across the three groups. In addition to the tangram task (measuring involvement), all children completed spatial tasks with a researcher (WISC-IV subtests Block Design and Matrix Reasoning) and no differences were found between groups,

which suggests lack of ability was not likely to be a factor in the completion of the tangram task for children in the ASD-anxious group.

A third explanation for the higher levels of parental involvement in the ASD-anxiety group may relate to the rate at which children with ASD habituate to fearful situations. Wood et al. (2003) suggest children who are anxious can be very slow to habituate to novel situations, which may result in parental effort to encourage a child's approach behaviour being ineffective for a period of time. This may in turn extinguish the adaptive parenting response (i.e. encouraging approach behaviour) as it does not appear to be effective. Given many children with ASD have a rigid insistence on sameness and find change and novel situations to be very difficult, it is possible children with ASD and anxiety may take even longer to habituate to fearful situations, thereby having a stronger effect on extinguishing adaptive parental behaviour.

The current study did not replicate previous findings with respect to higher levels of parental negativity being associated with anxiety (Hudson & Rapee, 2001), with no difference found across clinical and non-clinical groups (in either task) in relation to parental negativity. However, this result is consistent with the conclusion that a weaker relationship exists between parental negativity and anxiety, and some research has shown there is instead potentially a stronger relationship with childhood depression (Beesdo et al., 2010; McLeod et al., 2007; Rapee, 1997).

A surprising result in the current study was the level of involvement found in the non-clinical group, which was higher than found in previous studies using a similar tangram task (Gar & Hudson, 2008; Hudson & Rapee, 2001). This may be a factor of the small sample size, or may have been influenced by the evaluative nature of the task held in a University setting, however a similar setting was also used in previous research. It is also possible the task itself was more difficult than that used in previous research,

however there was no similar increase in levels of involvement in the anxious group as compared to previous results.

A negative correlation was found between age and involvement in the non-clinical group. In other words, parents of non-clinical children intervened less as children became older. This same pattern was not evident in either clinical group, with consistent parental overinvolvement regardless of age in these groups. A possible explanation for this finding is that parents of children with anxiety may be less likely to change their behaviour in response to developmental changes and maturation in their child.

There are important limitations of the current study that should be considered. First, inclusion in the ASD group relied on a previous ASD diagnosis and was not independently verified, so it is possible some children included in the ASD-anxious group were sub-threshold ASD. The ASRS-SF parent-report measure was used as an additional indicator of ASD symptoms, and a significant difference was found between the ASD and non-ASD groups. A non-anxious ASD group was not included in the current study and it would be beneficial for future research to include this comparison group to examine the relationship between the presence of ASD alone and parent involvement. The inclusion of an assessment of parental psychopathology would also be beneficial for future research, to examine the potential interaction between parental psychopathology and parental rejection and control (Drake & Ginsburg, 2012).

Participants in the study were predominantly Caucasian and of relatively high socio-economic status, so there are consequent limits to the generalisability of these findings. Finally, due to the cross-sectional design of the study, causality and direction of effect cannot be inferred. Further longitudinal studies will be important to explore

causal influences, given the growing evidence of a reciprocal relationship between parental involvement and anxiety in children (Hudson & Dodd, 2012; Rapee, 2012).

The current findings have a number of important clinical implications. This study provides preliminary evidence that parental involvement is associated with anxiety in children with comorbid ASD and anxiety. Given the widely accepted role of parental overinvolvement in maintaining anxiety, the findings provide support for the inclusion of parenting strategies that address overinvolvement in ASD specific anxiety programs, as is currently the case in a number of existing programs (Chalfant, Lyneham, Rapee & Carroll, 2011; Reaven, Blakeley-Smith, Nichols, & Hepburn, 2011). However further research is needed to explore the interaction between ASD and anxiety and the impact this has on parenting responses. The concepts of adaptive and excessive protection provide a useful framework that questions the assumption that all overinvolvement is unhelpful in relation to anxiety. Parents of children with ASD have the challenge of determining the appropriate amount and type of intervention to provide, and it is important for treatment programs to address this.

In summary, the current study demonstrated that parental overinvolvement was associated with child anxiety in both children with ASD and typically developing children. In addition, parents of children with ASD and anxiety were significantly more involved than parents of children with anxiety alone, which indicates there are likely to be additional factors involved with respect to the interaction between ASD symptoms and anxiety. No relationship was found between parental negativity and anxiety in either group of children. While not demonstrating causality, these results provide preliminary support for the role of overinvolvement in the development and/or maintenance of anxiety in children with ASD that emphasises a relationship between parent-child interaction and anxiety. However an important distinction may be the

interaction between ASD symptoms and anxiety, and the consequent increase in parental involvement.

Chapter 3

Parental fear of negative child evaluation and its association with parental overinvolvement in children with autism spectrum disorder and anxiety disorders

Abstract

Preliminary evidence has identified fear of negative child evaluation (FNCE) as a possible mediator of parental anxiety and overinvolvement in children with anxiety. This study examined the relationship between parental anxiety, FNCE and overinvolvement in children with autism spectrum disorder (ASD) and anxiety. The sample consisted of children with ASD and anxiety (n = 19), non-ASD children with anxiety (n = 20) and non-clinical children (n = 18). Parents of anxious children reported higher levels of FNCE than parents of non-anxious children. Further analysis indicated that parents of children with ASD and anxiety reported significantly higher levels of FNCE than parents of children with anxiety alone. Higher levels of FNCE were associated with parental overinvolvement, however no mediating role was found for FNCE between parent anxiety and overinvolvement.

Parental fear of negative child evaluation and its association with parental overinvolvement in children with autism spectrum disorder and anxiety disorders

Anxiety is a common co-occurring problem for children with autism spectrum disorder (ASD) with reported prevalence rates of anxiety in children with ASD varying from 11-84% (White et al., 2009). This variation in part reflects emerging empirical guidance on the conceptualisation and assessment of anxiety disorders in this population, which has prompted a surge in research in this area in recent years. Questions have been raised as to the degree anxiety symptoms occur as a comorbid disorder, or represent an ASD-specific variant of anxiety (Kerns & Kendall, 2012). Evidence suggests that at least some children with ASD have true co-morbidity, experiencing anxiety disorders common to typically developing children (Kerns et al., 2014; Renno & Wood, 2013) with prevalence rates of between 42% (Simonoff et al., 2008) and 55% (de Bruin et al., 2006). However differences in the presentation of anxiety in some children highlight the potential interaction with ASD characteristics that can affect the development and/or expression of anxiety in these children (Kerns et al., 2014; Wood & Gadow, 2010).

Higher rates of problem behaviours such as aggression, disruptive behaviour and impulse control difficulties have been consistently associated with ASD (Brereton et al., 2006; Fodstad et al., 2012), and there is some evidence to suggest the presence of co-morbid anxiety may present a further increase in the risk of acting-out behaviours (Kim et al., 2000). A recent study found 41% of children with ASD and anxiety had a co-occurring disruptive behaviour disorder - i.e. oppositional defiant disorder and conduct disorder - (Storch et al., 2012) and Kim et al. (2000) found anxiety and mood problems

in children with ASD were associated with a higher incidence of aggressive and oppositional behaviours as compared to children with ASD alone.

A comparison of typically developing adolescents and ASD adolescents with similar levels of anxiety found a higher risk of behavioural problems in the ASD-anxious youth (Farrugia & Hudson, 2006), and there is also evidence of an increased risk of problem behaviours in children with ASD and anxiety as compared to children with other developmental disabilities comorbid with anxiety (Evans et al., 2005). One possibility is that children with ASD may be more likely to use externalising behaviours to avoid anxious situations (Storch et al., 2012). Moreover, children with ASD may have a delayed development in the ability to inhibit or regulate overt emotional responses to anxiety (Davis et al., 2011).

Regardless of the source (ASD-specific or anxiety related), problem behaviours in children with ASD are commonly identified as a major source of parental stress (Chalfant, 2011; Estes et al., 2009; Karst & Van Hecke, 2012; McStay, Dissanayake, Scheerem, Koot, & Begeer, 2014), and McStay et al. (2014) hypothesise the perception of others (i.e. external disapproval) may play a role in mediating the relationship between problem behaviours and parent stress. A recent study found parents of children with ASD reported higher levels of stigma (prejudicial attitudes and behaviour) from others about their child, compared to parents of children with intellectual disabilities or physical disabilities (Werner & Shulman, 2015). Given the potential presence of problem behaviours in children with ASD, parents may worry about negative evaluation of their child. This worry has been conceptualised as a fear of negative child evaluation (FNCE) and is a relatively recent construct in the childhood anxiety literature (de Vente et al., 2011; Schreier & Heinrichs, 2010).

FNCE was first proposed by Schreier and Heinrichs (2010) as a potential mediator of the relationship between parent and child social anxiety. In a sample of 9 to 16-year old children, a significant association was found between self-reported parental FNCE (both maternal and paternal) and social anxiety in typically developing children, and FNCE mediated the relationship between maternal social anxiety and child social anxiety. In a second study, de Vente et al. (2011) examined the transmission of social anxiety from parents to infants, and in particular the influence of FNCE on parenting behaviour in relation to early signs of childhood social anxiety. Results indicated parental social anxiety was associated with FNCE, and FNCE appeared to partially mediate the relationship between parental social anxiety and parental overinvolvement in mothers but not fathers. The findings provide insight into a potentially important cognitive factor that influences parental overinvolvement.

Together, the two previous FNCE studies provide preliminary evidence to suggest there may be an association between parent anxiety and FNCE, and in addition, the presence of FNCE may be associated with higher levels of parental involvement in families of children with anxiety. Research has consistently found children with anxiety are more likely to have anxious parents (Rapee, 2012), and while this has not yet been established in the ASD population, it is evident parents of children with ASD are at increased risk of mental health issues (Pisula, 2006; Rao & Beidel, 2009), including high levels of parental anxiety (Bitska & Sharpley, 2004). There is strong evidence supporting the association between parental overinvolvement and childhood anxiety in typically developing children (Drake & Ginsburg, 2012; McLeod et al., 2007; Rapee, 2012; Wei & Kendall, 2014; Wood et al., 2003) and preliminary evidence suggests parents of children with both ASD and anxiety show even higher levels of involvement (see Chapter 2). Theoretical models suggest parent anxiety may be associated with

anxiety-enhancing parent behaviours such as allowing avoidance of feared situations and overinvolvement (Ginsburg & Schlossberg, 2002; Hudson & Rapee, 2004), however the evidence linking parental anxiety and overinvolvement has been inconsistent (e.g. de Vente et al., 2011; Gar & Hudson, 2008). In a meta-analysis, van der Bruggen et al. (2008) found a weak and inconsistent relationship between parent anxiety and parental control. They concluded there was a nonsignificant relationship between parent anxiety and parental control, however in certain groups (school-age children and samples with an overrepresentation of boys) a significant relationship was found.

Aetiological models emphasise the reciprocal nature of child anxiety and parent behaviour. For example, Hudson and Rapee (2004) suggest parents of children with anxiety may become overinvolved to reduce or prevent their child's distress. Hudson et al. (2009) demonstrated the influence of child factors, finding parents of both anxious and non-anxious children showed greater levels of involvement when paired with an unrelated anxious child. Given the potential for a more overt and behavioural expression of distress in children with ASD, the motivation for parents to intervene may be even stronger.

The aim of the current study was to investigate the relationship between parent anxiety, FNCE and parental overinvolvement in children with ASD and anxiety. It was hypothesised that parents of anxious children would be higher in FNCE than parents of non-anxious children. The second hypothesis was that FNCE would be higher in the ASD-anxious group as compared to the anxious group as a result of the increased likelihood of problem behaviours in children with ASD. Third, it was hypothesised that FNCE would be associated with higher levels of parental involvement and would mediate the relationship between parent anxiety and parental involvement. A further aim of the study was to explore parent-reported reasons for task involvement to gain a

greater understanding of the motivation underlying parental intervention. It was expected parents might intervene to avoid or reduce their child's acting out behaviours and distress.

Method

Participants

The sample consisted of 57 child/parent dyads (19 children with a diagnosis of ASD and anxiety, 20 with anxiety disorders only and 18 non-clinical children). The children were aged 7 to 12 years, with a mean age of 9.3 years (*SD* = 1.5). The sample included 53 mothers and 4 fathers, with 1 father in each of the ASD-anxious and non-clinical groups, and 2 fathers in the anxious group. The participating parent self-identified as the primary caregiver for the child.

Children with ASD were recruited from families who attended the Macquarie University Emotional Health Clinic in Sydney, Australia, for assessment and treatment of comorbid anxiety (15 dyads), and through advertisements placed with local ASD service providers (4 dyads). All children had a documented diagnosis of either Asperger's disorder (7 children), autistic disorder/autism spectrum disorder (10 children) or PDD-NOS (2 children), and had been diagnosed by a paediatrician or clinical/developmental psychologist. To address the potential confound of low IQ in relation to parental overinvolvement, children who scored more than 2 standard deviations below the mean on any IQ measure administered as part of the study were excluded, which resulted in the exclusion of 2 dyads from the ASD-anxious group, leading to a final sample of 19.

Children in the anxious-only sample were also recruited from families who attended the Emotional Health Clinic in Sydney for assessment and treatment for anxiety. Children were assessed for anxiety by postgraduate students in clinical psychology using the Anxiety Disorders Interview Schedule for DSM-IV: Child and

Parent Version (ADIS-C/P; Silverman & Albano, 1996) therefore diagnoses were made in accordance with DSM-IV (American Psychiatric Association, 2000). Children with ASD were assessed using only the parent version of the Anxiety Disorders Interview Schedule (ADIS-P), with some parent interviews conducted over the phone. Telephone administration of the ADIS-P with parents only has been shown to be comparable to separate face-to-face interviews with both child and parent (Lyneham & Rapee, 2005).

To be eligible to participate in the study, children from both the ASD-anxious and anxious groups were required to meet criteria for one or more anxiety disorders with diagnosis made in accordance with DSM-IV. The percentage frequencies of primary anxiety disorders for the ASD-anxious and anxious groups are presented in Table 1. Eighty-five percent of children in the anxious group were diagnosed with more than one anxiety disorder, and 74% in the ASD-anxious group. Twenty percent of children in the anxious group and 32% in the ASD-anxious group also met criteria for ADHD (based on prior assessment).

Table 1

Percentage frequencies of primary anxiety disorders (participant numbers appear in parentheses) across the ASD-anxious and anxious groups

	ASD-anxious (n = 19)	Anxious (n = 20)
Generalised anxiety disorder	58 (11)	45 (9)
Social anxiety disorder	21 (4)	30 (6)
Separation anxiety disorder	11 (2)	10 (2)
Specific phobia	5 (1)	5 (1)
Obsessive compulsive disorder	5 (1)	5 (1)
Panic disorder	0	5 (1)

Note. ASD = autism spectrum disorder.

The non-clinical children were recruited from the community via an advertisement distributed through local public schools requesting confident children who had never sought help from a mental health professional. Children were assessed for anxiety over the telephone using the Anxiety Disorders Interview Schedule for DSM-IV: Parent Version (ADIS-P; Silverman & Albano, 1996) and were included in the non-clinical sample if they did not meet criteria for an anxiety disorder. Non-clinical families scoring 2 standard deviations above the mean on any study measures were excluded from the study to ensure a non-clinical group, which resulted in the exclusion of 2 dyads. Non-clinic referred families (in both the non-clinical and ASD-anxious groups) were given $100 for participating in the study.

Tasks

Task 1: Tangram task. The parent and child were seated at a table and asked to complete a tangram puzzle in a 5-minute period. This observational task provides a measure of parental involvement and negativity and was developed by Hudson and Rapee (2001). The child was given a set of geometric pieces and asked to arrange the pieces to create the same shape presented on a card. The task was designed to be too difficult to complete within the 5 minutes. The following instructions were given to the parent: "This is a test of your child's ability. We want to see how good he/she is at thinking. Mum/Dad, you are going to sit there for support and you will have the answers for interest. Most kids can do it but some find it a bit hard to get going. You can help if you think he/she really needs it." The parent was given the answer card to ensure a lack of skill did not influence the level of assistance they provided. Once the instructions were read the researcher left the room for 5 minutes, and the task was videotaped.

Task 2: Parent review of tangram task. On completion of the tangram task the parent and researcher then watched the video of the parent and child completing the task, and the parent was given the following instructions: "We are interested in finding out why parents intervene at a particular time. As you watch the video please explain to me what you were thinking as you worked with your child to complete the task." The parent's response was audiotaped.

Parent behaviour measures

Observation. Task 1: Tangram task. The parent and child tangram task was coded using the tangram coding manual developed by Hudson and Rapee (2001). The parent-child interactions were coded on five global scales, which were combined to create the involvement factor. The involvement factor assessed the overall degree of

help the parent gave and was calculated as the mean score of the following scales: (i) general degree of parent's involvement, (ii) unsolicited help, (iii) degree of parent touching of tangram pieces, (iv) parent's position, and (v) parent's focus during the task. Each scale was rated on a nine-point continuum from 0-8, with ratings of 0-3 used to code less involved interactions and ratings of 5-8 used for more involved interactions.

Coding was completed by two postgraduate clinical psychology students who were unaware of the diagnostic status of the child. The primary coders coded 100% of the interactions between them, and forty percent of interactions were double coded by the first author to assess inter-rater reliability. All coders were trained in the use of the coding manual until 80% agreement between coders was reached. Intraclass correlations were calculated to assess coding reliability for the involvement factor, with inter-rater reliability found to be very high, $ICC(2,1) = 0.91$, $p < 0.01$.

Observation. Task 2: Parent review of tangram task. Each five-minute transcript was analysed by the first and third authors to identify themes evident in the parent response as to why they did or didn't intervene during the tangram task. Based on this analysis, the following five codes were identified: (i) helping to avoid child's negative emotion; (ii) helping child to get started/attend; (iii) reference to child not wanting help; (iv) reference to wanting the child to complete on their own; (v) parent awareness of overinvolvement.[2] A postgraduate student who was blind to the child's diagnosis, rated 100% of transcripts, identifying each code as present or absent. The first author re-rated 25% of the transcripts to determine the inter-rater reliability. Inter-rater agreement for the five codes were all good to very good, with kappa values as follows: (i) avoid negative emotion, $k = 1.00$; (ii) get started/attend, $k = 0.72$; (iii) child

[2] The 'Parent Review of Tangram' Coding Manual can be found at Appendix A.

not wanting help, *k* = 0.76; (iv) child to complete on own, *k* = 1.00; (v) awareness of overinvolvement, *k* = .74.

Fear of negative child evaluation

Parental fear of negative evaluation of their child was measured using the parent-report Fear of Negative Child Evaluation Questionnaire (FNCE-Q; de Vente et al., 2011), which was developed by modifying 10 items of the brief Fear of Negative Evaluation Scale (Brief-FNE; Leary, 1983). The Brief-FNE has been found to have good psychometric properties, including good internal consistency with a Cronbach's alpha of .90, and a high correlation with the longer version of the FNE (Leary). The 10 items of the FNCE-Q are rated using a 5-point scale from 0 (not at all characteristic of me) to 4 (extremely characteristic of me). The FNCE-Q demonstrated excellent internal consistency in the current study with a Cronbach's alpha of .95.

Parental anxiety

Parental anxiety was measured using the 21-item Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995). The DASS-21 consists of seven items for each of the three subscale measures of depression, anxiety and stress. Participants rate each item based on a 4-point scale from 0 (does not apply to me at all) to 3 (applies to me very much, or most of the time). The DASS-21 has demonstrated good internal consistency and concurrent validity (Antony et al., 1998). In this study the DASS-21 anxiety subscale demonstrated acceptable internal consistency with a Cronbach's alpha of 0.68.

Cognitive assessment

The Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV) is an individually administered measure for assessing cognitive ability consisting of 10 core subtests that combine to give four composite index scores and a full scale IQ score

(Wechsler, 2003a). The WISC-IV assessment was used to ensure groups did not differ based on cognitive ability. Four of the 10 subtests (Vocabulary, Similarities, Block Design and Matrix Reasoning) were administered to provide an assessment of verbal comprehension and perceptual reasoning. The WISC-IV has demonstrated good reliability and validity based on a normative sample of 2,200 children, with internal consistency values of .89 for both Vocabulary and Matrix Reasoning, and .86 for Similarities and Block Design (Weschler, 2003b).

Symptom measures

Two additional questionnaires were administered to provide further support for the distinction between the clinical and non-clinical groups. The first was the parent report Autism Spectrum Rating Scales Short Form (ASRS-SF; Goldstein & Naglieri, 2010) used to screen for symptoms and behaviour associated with a diagnosis of ASD. The ASRS-SF consists of 15 items and parents use a 5-point scale to rate each item based on how often their child demonstrated a behaviour over the past four weeks, from 0 (never) to 4 (very frequently). The ASRS-SF has demonstrated high levels of internal consistency and discriminant validity in differentiating individuals with ASD from non-clinical or other clinical group members (Goldstein & Naglieri, 2010). The ASRS-SF also demonstrated excellent internal consistency in the current study with a Cronbach's alpha of 0.94.

The Spence Children's Anxiety Scale – Parent Report (SCAS-P; Spence, 1999), was used as a measure of child anxiety symptoms providing additional support for the distinction between anxious and non-anxious children. The SCAS-P is a 38-item questionnaire that provides an overall measure of child anxiety symptoms, as well as six anxiety symptom subscales that align to six DSM-IV anxiety disorders. Parents rate each item based on how accurately it describes their child using a 4-point scale from 0

(never) to 3 (always). The SCAS-P has demonstrated good internal consistency for the total scale score and was found to be effective in discriminating clinical and non-clinical children (Nauta et al., 2004). In the current study the SCAS-P had excellent internal consistency with a total scale Cronbach's alpha of 0.95.

Procedure

Prior to participating in the study, informed written consent was obtained from parents and children provided verbal consent. The child completed the WISC subtests with the researcher, while the parent completed questionnaires. Once the IQ tasks were completed, the parent and child were seated next to each other and the child was given five minutes to complete the tangram task while the researcher left the room. The tangram task was videotaped and once completed, the parent and researcher watched the video of the parent and child completing the task, while the child waited in another room. The procedures in this study were approved by the Macquarie University Human Ethics Committee.

Results

Preliminary analyses

Demographics. The three groups did not differ significantly with respect to age, gender, ethnic background, family income, family composition or IQ (as measured by the Vocabulary, Similarities, Block Design and Matrix Reasoning WISC-IV subtests), $p < 0.05$ (refer to Chapter 2 for more details).

Boys and girls did not differ in FNCE, $t(55) = .25$, $p > 0.05$ and there was no significant relationship between FNCE and age across the entire sample, $r = -.11$, $p > 0.05$. There was also no significant relationship between FNCE and age within groups. Analysis of the relationship between parental involvement and age can be found in Chapter 2.

Descriptive measures. The ASRS-SF and SCAS-P provided further differentiation between groups, with significantly higher scores on these measures for children with ASD and children with anxiety, respectively. Refer to Chapter 2 for more detail.

Comparison between groups regarding FNCE and parent anxiety

Between group differences regarding FNCE were investigated using one-way ANOVAs and follow-up planned contrasts, and the mean scores for FNCE are presented in Table 2. The three diagnostic groups differed with respect to FNCE, $F(2,54) = 11.67$, $p < 0.01$, and follow-up planned contrasts revealed a significant difference between the non-clinical and clinical groups, $t(54) = 3.17$, $p < 0.01$, with a medium-sized effect, $r = 0.40$, indicating parents of anxious children were significantly more concerned about others evaluating their child negatively. There was also a significant difference between the ASD-anxious group and the anxious group regarding FNCE, $t(54) = 3.69$, $p < 0.01$. A medium effect size was found, r = 0.45, with parents of children with ASD and anxiety on average showing almost twice the level of concern regarding negative evaluation of their child as compared to parents of children with anxiety only.

The mean scores for parent anxiety are also in Table 2. A significant difference was found between groups with respect to parent anxiety, $F(2,54) = 8.84$, $p < 0.01$, with parents of children with anxiety (both ASD and non-ASD) scoring significantly higher than the non-anxious group, $t(54) = 4.01$, $p < 0.01$.

Table 2

Mean FNCE and parental anxiety scores

	ASD-anxious (n = 19)	Anxious (n = 20)	Non-clinical (n = 18)
FNCE	21.4 (10.8)	11.2 (8.0)	8.5 (6.4)
DASS-21-Anxiety	4.7 (4.3)	6.3 (5.2)	.9 (1.7)

Note. ASD = autism spectrum disorder. Standard deviations appear in parentheses. DASS-21 = Depression Anxiety Stress Scales.

Parental overinvolvement, parental anxiety and FNCE

Table 3 shows the means and standard deviations for parental involvement across the three groups.

Table 3

Mean involvement scores on the tangram task

	ASD-anxious (n = 19)	Anxious (n = 20)	Non-clinical (n = 18)
Involvement*	5.5 (1.1)	4.6 (1.2)	4.2 (1.4)

Note. ASD = autism spectrum disorder. Standard deviations appear in parentheses. *For the purposes of meta-analysis this data was previously reported in Chapter 2.

Correlations between FNCE and parental anxiety and parent involvement are presented in Table 4. Involvement was positively correlated with FNCE, and in turn FNCE was positively correlated with parental anxiety. No association was found between parent anxiety and involvement. Given the non-significant relationship between parental anxiety and involvement, no further tests of mediation were conducted.

Table 4

Correlations between parental involvement, fear of negative child evaluation and parental anxiety

	FNCE	Involvement
FNCE		.333*
DASS-21 - Anxiety	.346**	.150

Note. FNCE = Fear of Negative Child Evaluation. DASS-21 = Depression Anxiety Stress Scales. *$p < .05$. **$p < .01$.

Comparison between groups on parent review of tangram task

Table 5 shows frequencies of the five parent review tangram codes for each group. Differences between diagnostic groups were investigated using chi-squared tests comparing the parent review codes across the three groups. Results showed a significant difference between groups in rates of helping to avoid negative emotion χ^2 (2, N = 57) = 9.22, $p < 0.05$, and evidence of the child not wanting help, χ^2 (2, N = 57) = 6.10, $p < 0.05$. Follow-up comparisons revealed a significant difference between the ASD and non-ASD groups regarding parents intervening to avoid negative emotion, χ^2 (1, N = 57) = 8.52, $p < 0.01$. The odds ratio was 5.9, indicating parents of ASD children were significantly more likely to intervene to avoid or reduce negative emotion in their child as compared to parents of non-ASD children. Follow up comparisons also revealed a significant difference between clinical and non-clinical groups in relation to the child indicating they did not want help, χ^2 (1, N = 57) = 5.04, $p < 0.05$, with an odds ratio of 4.3, indicating parents of non-anxious children were significantly more likely to believe their child did not want help as compared to anxious children.

Table 5

Frequencies (%) of codes for parent review of tangram task

	ASD-anxious (n = 19)	Anxious (n = 20)	Non-clinical (n = 18)
Avoid negative emotion	52.6 (10)	10.0 (2)	22.2 (4)
Helping engage/attend	47.4 (9)	45.0 (9)	38.9 (7)
Child does not want help	5.3 (1)	20.0 (4)	38.9 (7)
Parent wants child to complete	47.4 (9)	45.0 (9)	55.6 (10)
Parent aware of overinvolvement	26.3 (5)	30.0 (6)	33.3 (6)

Note. ASD = autism spectrum disorder.

Discussion

The aim of this study was to investigate the relationship between parental anxiety, fear of negative child evaluation (FNCE) and overinvolvement in children with ASD and anxiety. Parents of anxious children (with and without ASD) showed significantly higher levels of FNCE as compared to non-anxious children; and further comparison within the anxious group showed FNCE was significantly higher in parents of children with ASD as compared to typically developing children. As expected, FNCE was associated with both parental anxiety and parental overinvolvement.

Higher levels of FNCE in parents of anxious children is consistent with previous preliminary findings of an association between parental fear of negative child evaluation and child social anxiety, and may reflect a number of possible processes (de Vente et al., 2011; Schreier & Heinrichs, 2010). Evidence suggests children rely on parent-based reasoning in addition to their own internal emotional reasoning to assess potential

threat in a situation (Morren, Muris, Kindt, Schouten, & van den Hout, 2008). In other words, children may base their own threat interpretation in part on observation of parent's fear-based reactions (motivated by FNCE) and overestimate the potential threat in a situation, thereby increasing their own anxiety. Further observational studies are needed to assess whether parents scoring high on FNCE show observable signs of anxiety in parent-child ambiguous threat situations (Schreier & Heinrichs, 2010). A second explanation for higher levels of FNCE in parents of anxious children may relate to heritability, with this finding simply reflecting the higher incidence of anxiety among first-degree relatives of a child diagnosed with an anxiety disorder (Rapee, 2012). It is also likely that a reciprocal relationship is present with a child's anxious behaviour and prior experiences, over time eliciting parental FNCE.

Further analysis of FNCE revealed significantly higher levels of parental FNCE in parents of children with ASD and anxiety as compared to children with anxiety alone, with ASD parents reporting almost twice the level of FNCE. There are a number of possible explanations for this. Anxious behaviour in children with ASD may be more likely to manifest in higher levels of distress (Davis et al., 2011) and problem behaviours (Evans et al., 2005; Farrugia & Hudson, 2006; Kim et al., 2000; White et al., 2009), which may draw unwanted attention from others causing possible embarrassment to parents and fear of negative judgment. This is supported by evidence suggesting parents of children with ASD report higher levels of stigmatisation as compared to parents of children with other disabilities (Werner & Shulman, 2015). It is also likely that ASD-characteristics such as odd or unusual behaviours, as well as challenging behaviours, may elicit FNCE regardless of the presence of anxiety.

Further examination of parent characteristics found a positive relationship between FNCE and parent anxiety, with higher rates of anxiety found in parents of ASD-

anxious and anxious children. This relationship between parent anxiety and FNCE is consistent with previous research which found an association between parental social anxiety and FNCE (de Vente et al., 2011; Schreier & Heinrichs, 2010). It is likely that high levels of parent anxiety exacerbate FNCE, however the presence of FNCE in response to child characteristics may also contribute to parental anxiety. It may also be that the two parental measures (FNCE and anxiety) represent different facets of the same anxiety construct, with the FNCE measure representing cognitive appraisal and the parent anxiety measure representing anxious arousal.

As hypothesised, higher levels of FNCE were associated with parental overinvolvement which is consistent with the findings of de Vente et al. (2011) in relation to childhood social anxiety. It is likely that parents high in FNCE are motivated to step in more quickly and intervene to avoid perceived negative evaluation of their child, which may result in parents unwittingly allowing or facilitating a child's avoidant behaviour. Parent-reported reasons for involvement were investigated to gain a greater understanding of the motivation behind parental intervention during the tangram task. Across all groups, parents did not report FNCE as a factor in their decision to intervene, however parents of children with ASD and anxiety were significantly more likely to report they intervened to avoid their child experiencing negative emotion. This is consistent with the theory that parental overinvolvement may occur in part to reduce or prevent a child's distress (Hudson & Rapee, 2004). As noted previously, higher levels of distress in response to anxiety in children with ASD (Davis et al., 2011), as well as an increased likelihood of acting out behaviours in children with ASD (Evans et al., 2005; Farrugia & Hudson, 2006; White et al., 2009), are likely to mean that parents are motivated to reduce both the distress and problem behaviour by intervening early.

Another interesting finding in relation to parent-reported reasons for intervening was that parents of non-anxious children were more likely to report they believed their child did not want parental help, effectively discouraging parental intervention. In other words, parents of non-anxious children believed their child did not need their assistance. However it is important to note this is based on *perceived* absence of help requests and may relate to historical knowledge *or* in situ feedback, as child behaviour was not assessed. Further research is needed to examine ways in which a child may covertly or overtly elicit (or not discourage) parental overinvolvement.

Parents reported further reasons for intervening/not intervening but these did not differentiate between groups. Equally across groups parents reported intervening to help their child engage or attend to the task, and not intervening as they believed their child wanted to complete the puzzle on their own. Interestingly there was no difference in the level of parental awareness of involvement across groups, which was approximately 30 percent.

Contrary to our hypothesis, no relationship was found between parent anxiety and overinvolvement, so no further test of mediation for FNCE was conducted. This result is consistent with some previous studies which found no association between parent anxiety and overinvolvement (Gar & Hudson, 2008; Moore et al., 2004; van der Bruggen, Bogels, & van Zeilst, 2010). However, the results of the current study conflict with theoretical models which suggest parent anxiety contributes to anxiety-promoting parent behaviours such as overcontrol (Ginsburg & Schlossberg, 2002; Hudson & Rapee, 2004), and findings in support of a relationship between parent anxiety and overinvolvement (Schreier & Heinrichs, 2010; Whaley, Pinto, & Sigman, 1999). Some evidence suggests parent anxiety may only be associated with certain parent behaviours such as anxious modeling and avoidance (Drake & Ginsburg, 2011), and there is also

evidence of a reciprocal relationship with child anxiety predicting parenting behaviour (Drake & Ginsburg, 2011; Hudson et al., 2009). It is also possible the results of the current study were influenced by the use of a measure of anxiety symptoms (DASS-21) rather than a diagnosed anxiety disorder to assess parent anxiety. The DASS-21 anxiety subscale may not have provided an adequate measure of parental anxiety with its emphasis on physical anxiety symptoms. The use of a self-report measure of parent anxiety is also subject to potential bias and a structured diagnostic interview would provide a better measure of parent anxiety.

There are other limitations associated with the current study that should be considered. Firstly, the study did not include an ASD only (i.e., non-anxious) group to provide a comparison of the influence of an ASD diagnosis alone on FNCE and parental involvement, which would be a useful addition in future research. Secondly, participants in the ASD-anxious group required a prior diagnosis of ASD, which was not independently verified as part of this study, so it is possible children who were sub-threshold ASD were included in the ASD group. The ASRS-SF (administered as part of the study) did however provide a further indication of ASD symptoms with a significant difference found between the ASD and non-ASD children. Finally, there are limits to the generalisability of the findings as participants in the study were predominantly Caucasian and of relatively high socio-economic status.

In addition to the limitations above, it is important to note the findings of this study do not indicate causal relationships. Given the cross-sectional design it is not possible to provide any indication on the direction of effect between the variables studied. However as outlined above, a possible explanation of the findings is that the interaction of ASD characteristics and both child and parent anxiety may increase the likelihood of FNCE which in turn contributes to the high levels of parental involvement

found in children with ASD and anxiety. Future longitudinal and experimental research is needed to provide further understanding of the direction, and possible reciprocal nature, of the relationship between these factors.

The findings of the current study have important clinical implications as they provide insight into parent cognitive factors that may influence the development and maintenance of childhood anxiety in children with ASD. Fear of negative child evaluation may lead parents to intervene too quickly and become overinvolved, although it is important to note parents did not report this as the reason for intervention. It seems probable that child-characteristics associated with ASD influence FNCE and may provide further understanding as to why higher levels of parental involvement have been found in children with both ASD and anxiety. Helping parents understand how and why certain parenting behaviours may have developed is an important part of anxiety treatment programs, particularly with respect to overinvolvement given its role in the maintenance of childhood anxiety.

Overall, the findings indicate that parents of children with anxiety (both ASD and non-ASD) were more likely to fear negative evaluation of their child. In addition, parents of children with both ASD and anxiety reported significantly higher levels of FNCE than parents of children with anxiety alone. FNCE was associated with both parental anxiety and overinvolvement across all groups. The results highlight a potentially important parent cognitive factor relevant to parent-child interactions (specifically overinvolvement) in children with anxiety and comorbid ASD.

Chapter 4

Ambiguous threat interpretation in children with autism spectrum disorder and anxiety disorders

Abstract

Interpretation bias towards threat is central to cognitive models of anxiety and there is evidence of a strong association between the presence of such bias and anxiety. This study investigated threat interpretation bias in children with autism spectrum disorder (ASD) and comorbid anxiety. A sample of 57 children aged 7–12 years participated in the study comprised of children with ASD and anxiety (n = 19), typically developing children with anxiety disorders (n = 20) and non-clinical children (n = 18). Interpretation bias towards threat was assessed by asking children to interpret a series of ambiguous situations and coding each response as either *threat* or *non-threat*. Contrary to expectations there was no difference in threat interpretation between clinical and non-clinical children. Anxious children reported significantly higher levels of perceived threat in ambiguous social situations as compared to children with both ASD and anxiety, however there was no difference in threat interpretation in ambiguous physical situations. Analysis of the plan of action children came up with in ambiguous situations revealed no difference with respect to avoidant solutions across the three groups. The results are discussed in the context of the potential influence of cognitive processes associated with ASD.

Ambiguous threat interpretation in children with autism spectrum disorder and anxiety disorders

Anxiety symptoms commonly occur in children with autism spectrum disorder (ASD), and estimates suggest almost half of all children diagnosed with ASD present with symptoms that would meet criteria for an anxiety disorder (de Bruin et al., 2006; Simonoff et al., 2008). However evidence also suggests a number of children with ASD experience atypical anxiety that may be influenced by the interaction with ASD characteristics (Kerns & Kendall, 2012; Kerns et al., 2014). A number of CBT-based treatment programs have been developed targeting anxiety in children with ASD, which broadly assume the same cognitive processes found in typically developing children with anxiety also underlie anxiety in children with ASD (Chalfant, Lyneham, Rapee, & Carroll, 2011; Reaven, Blakeley-Smith, Nichols, & Hepburn, 2011). However there is very limited understanding of the cognitive processes associated with anxiety in children with ASD and the potential role of ASD-related cognition.

According to cognitive models of anxiety in typically developing children, cognitive biases such as attentional and processing biases are fundamental mechanisms underlying anxiety (Beck & Clark, 1997; Muris & Field, 2008). Attentional bias refers to the allocation of attentional resources to threatening stimuli, while processing bias refers to the tendency to overestimate the potential threat in a situation (known as interpretational bias) and to underestimate the ability to cope. While evidence of the association between attentional bias and anxiety in children has been mixed (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007; Roy et al., 2008), there is strong evidence of an association between anxiety and a bias towards threat (Hadwin et al., 2006).

Experimental studies based on ambiguous situations have consistently found an association between childhood anxiety and an interpretation bias towards threat (Barrett et al., 1996; Bogels & Zigterman, 2000; Creswell et al., 2005; Muris et al., 2003). Barrett et al. (1996) also found anxious children were more likely to identify avoidant solutions in response to an ambiguous situation. Further evidence of the relationship between interpretation bias and childhood anxiety has been found in experimental studies using homographs that have both a threatening and neutral meaning, with anxious children more likely to select the threatening meaning (Hadwin et al., 1997; Taghavi et al., 2000). More recently a performance-based measure has been used to assess interpretation bias which presents a stimuli and requires an interpretation/response within 3500 ms, and has replicated findings of an association between anxiety and interpretation bias towards threat (Rozenman et al., 2014). There has also been some evidence that interpretation bias predicts anxiety symptoms over time with threat interpretations found to predict anxiety symptoms at 12-month follow-up in preschool-aged children (Dodd et al., 2012).

Despite the significant increase in research on anxiety in children with ASD in recent years, very few experimental studies have compared anxiety related cognition in typically developing children and children with ASD, and as far as the authors are aware no published studies to date have looked at interpretation bias towards threat specifically in children with ASD and anxiety. There is however some preliminary evidence of bias associated with the interpretation of emotions in children with ASD only, with ASD youth more likely to interpret neutral faces as negative (Kuusikko, et al., 2009). Two studies have examined attentional bias in children with ASD and anxiety (Hollocks, Ozsivadjian, Matthews, Howlin, & Simonoff, 2013; White, Maddox, & Panneton, 2015), and a further two related studies have examined cognitive appraisals

in children with ASD and anxiety (Sharma, 2014; Sharma, Woolfson, & Hunter, 2014). Sharma et al. (2014) examined cognitive appraisals of hypothetical frustrating situations made by children with ASD and typically developing children and found children with ASD were more likely to hold negative expectancies regarding the outcome of hypothetical frustrating situations and were more likely to have a low belief in their ability to cope. In the ASD group, the presence of anxiety symptoms was associated with higher self-accountability, or in other words inflated self-blame. However it is not possible to determine from the results of the study whether this bias towards negative expectancies is associated with ASD or anxiety or both.

Given anxiety–related cognitions are a target for change within ASD-specific anxiety treatment programs (Chalfant et al., 2011; Reaven et al., 2011), it is important to understand whether the cognitive processes associated with anxiety are altered in any way by the presence of ASD. For example, ASD is characterised by impairments in social cognition such as Theory of Mind (ToM), and deficits in attending to and encoding social information (Bauminger-Zviely, 2013) which may impact appraisal and interpretation. However the presence of anxiety disorders comparable to those found in typically developing children suggest there may be similar anxiety-related cognitive processes, at least in some children with ASD.

The aim of the current study was to investigate the nature of interpretation bias towards threat in children with ASD and anxiety. This study is the first to examine threat interpretation bias in children with ASD and anxiety. Consistent with the literature in relation to typically developing children with anxiety, it was hypothesised that (i) clinical children (i.e. both ASD-anxious and anxious) would demonstrate greater levels of interpretation bias to threat as compared to non-clinical children, (ii) children with ASD and anxiety would demonstrate similar levels of threat interpretation to

typically developing children with anxiety, and (iii) clinical children would identify more avoidant solutions as compared to non-clinical children.

Method

Participants

The sample consisted of 57 children aged 7-12 years (19 children diagnosed with ASD and anxiety, 20 children with anxiety and a control group of 18 non-clinical children). Children in the ASD-anxious group were recruited from the Centre for Emotional Health Clinic at Macquarie University, in Sydney Australia for assessment and treatment of anxiety, and through advertisements placed with local ASD service providers. All children had a documented diagnosis of either autism spectrum disorder/autistic disorder, Asperger's disorder or PDD-NOS and had been previously diagnosed by a paediatrician or clinical/developmental psychologist.

Children in the anxious group were also recruited from families attending the Centre for Emotional Health Clinic for assessment and treatment of anxiety. Children in both groups were assessed for anxiety by clinical psychology postgraduate students using the Anxiety Disorders Interview Schedule for DSM-IV (ADIS; Silverman & Albano, 1996) therefore diagnoses were made in accordance with DSM-IV (American Psychiatric Association, 2000). Children in the anxious group were assessed in person using the parent and child versions of the ADIS, while children with ASD were assessed using the parent only version either in person or over the telephone. Telephone administration of the ADIS-P with parents has been shown to be comparable to separate face-to-face interviews with child and parent (Lyneham & Rapee, 2005). Children were required to meet criteria for one or more anxiety disorders for inclusion in both the ASD-anxious and anxious groups.

Seventy-four percent of children in the ASD-anxious group and 85% of children in the anxious group were diagnosed with more than one anxiety disorder. Twenty percent of children in the anxious group and 32% in the ASD-anxious group also met criteria for ADHD based on a prior diagnosis. Percentage frequency of primary anxiety disorder for the ASD-anxious and anxious groups respectively were as follows (with participant numbers in parentheses): generalised anxiety disorder, 58 (11) and 45 (9); social anxiety disorder, 21 (4) and 30 (6); separation anxiety disorder, 11 (2) and 10 (2); specific phobia, 5 (1) and 5 (1); obsessive compulsive disorder, 5 (1) and 5 (1); and panic disorder, 0 (0) and 5 (1). For more information about the sample refer to Chapter 2.

The non-anxious children were recruited via advertisements in local public schools requesting children who had never sought help from a mental health professional. Children were assessed for anxiety over the telephone using the Anxiety Disorders Interview Schedule for DSM-IV: Parent Version (ADIS-P; Silverman & Albano, 1996) and were included in the non-clinical sample if they did not meet criteria for an anxiety disorder. Non-clinical families scoring 2 standard deviations above the mean on any study measures were excluded from the study to ensure a non-clinical group, which resulted in the exclusion of 2 children with a final non-clinical sample of 18 children. Non-clinic referred families (in both the non-clinical and ASD-anxious groups) were given $100 for participating in the study.

Tasks

Ambiguous situations task. Children's interpretation of threat was assessed using 12 ambiguous situations (6 based on physical threat and 6 on social threat). Each situation could be interpreted as either threatening or non-threatening, and was based on the method developed by Barrett et al. (1996). Children were seated alone with a

researcher and were given the following instructions: "I am going to tell you about some situations you might find yourself in and ask you what you would think and do about them. This is not an exam because there are no right or wrong answers. If you do not understand anything, please feel free to ask". A researcher read each of the 12 scenarios to the child, initially asking the child to respond as to what they think is happening in the situation (free-response). The child was then presented with two printed options as to what could be happening (one threat and one non-threat based) and asked to choose one option (forced-choice). They were then asked "what would you do about it?", referring to the ambiguous situation.

Measures

Ambiguous situations task. Based on the method developed by Barrett et al. (1996), child responses to the ambiguous situations task were coded as 0 for a non-threat response (e.g. "They are laughing about something in the game") and 1 for a threat response (e.g. "One of them has told a nasty joke about you"). Total threat scores for the free-response and forced-choice answers was calculated by adding each of the 12 responses, with a higher score indicating a greater number of threat responses. Total scores for physical and social situations were also calculated by adding responses individually for the 6 physical and 6 social situations (again separately for both free-response and forced-choice answers). Children were also asked what they would do in the situation with responses coded as prosocial (a prosocial, constructive solution) or avoidant (a solution based on escape or avoiding a potentially harmful or embarrassing situation). Coding for both threat interpretation and response/solution was completed by the first author who was blind to the diagnostic status of the child. Twenty-five percent of responses were randomly selected and coded by an additional coder to assess inter-rater reliability. Intraclass correlations were calculated to assess coding reliability,

with inter-rater reliability found to be very high for both the free-response threat interpretation, ICC(2,1) = 0.93, $p < 0.01$, and the free-response solution, ICC(2,1) = 0.91, $p<0.01$

Questionnaires. The Autism Spectrum Rating Scales Short Form (ASRS-SF; Goldstein & Naglieri, 2010) was administered to parents to provide a measure of autism symptoms and behaviour, as a further distinction between ASD and non-ASD children. The ASRS-SF is comprised of 15 items taken from the longer version of the ASRS that were selected as the items that best differentiate between children with and without ASD. The ASRS-SF asks parents to indicate how often their child demonstrated a behaviour over the past four weeks, from 0 (never) to 4 (very frequently). The ASRS-SF has demonstrated high levels of internal consistency and discriminant validity in differentiating individuals with ASD from non-clinical or other clinical group members (Goldstein & Naglieri, 2010). The ASRS-SF also demonstrated excellent internal consistency in the current study with a Cronbach's alpha of 0.94.

The Spence Children's Anxiety Scale – Parent Report (SCAS-P; Spence, 1999), was used as a measure of child anxiety symptoms. The SCAS-P is a 38-item questionnaire that provides an overall measure of child anxiety symptoms, with each item rated as to how accurately it describes the child using a 4-point scale from 0 (never) to 3 (always). The SCAS-P total scale score has demonstrated good internal consistency, and was found to be effective in discriminating clinical and non-clinical children (Nauta et al., 2004). In the current study the SCAS-P had excellent internal consistency with a total scale Cronbach's alpha of 0.95.

Procedure

Prior to participating in the study, parents signed a written consent form and children provided verbal consent. Following the administration of the ADIS (Silverman

& Albano, 1996) diagnostic interviews (either in person or by telephone) parents completed the ASRS-SF and SCAS-P questionnaires. While parents were completing questionnaires, children were interviewed regarding their response to the 12 ambiguous situations. The procedures in this study were approved by the Macquarie University Human Ethics Committee.

Results

Preliminary analyses

Demographics. The three groups did not differ significantly with respect to age, gender, ethnic background, family income, family composition or IQ (as measured by the Vocabulary, Similarities, Block Design and Matrix Reasoning WISC-IV subtests), $p > 0.05$ (refer to Chapter 2 for more details of the sample characteristics).

There were no significant differences between boys and girls with respect to total threat interpretations or social and physical situations for either free-response or forced-choice options (p's > .05). There were also no significant relationships between age and any of the threat interpretations (p's > .05).

Group differentiation measures. The ASRS-SF and SCAS-P provided further differentiation between groups, with significantly higher scores on these measures for children with ASD and children with anxiety respectively (Refer to Chapter 2 for more detail on the results of these measures).

Comparison between groups regarding threat interpretation and avoidance

The mean scores for total free and forced-choice child threat interpretation responses are in Table 1, along with avoidant solutions. Between group differences regarding child threat interpretation were investigated using one-way ANOVAs and follow-up planned contrasts to investigate the two a priori hypotheses. Given the contrasts were independent no corrections were required. The three diagnostic groups

differed with respect to threat interpretations for the free-response option only, $F(2,54) = 3.38$, $p < 0.05$, $r = 0.33$. The follow-up planned contrasts for the free-response revealed no significant differences between clinical (both ASD and non-ASD children with anxiety) and non-clinical children, however a significant difference was found in relation to the ASD-anxious and anxious group, with children in the anxious group reporting higher levels of threat than children with both ASD and anxiety, $t(54) = 2.13$, $p < 0.05$, with a small-medium effect size $r = 0.28$. There were no between group differences for the forced choice response, $F(2,54) = 0.44$, $p > 0.05$, $r = 0.13$.

Further analysis was conducted separately for the 6 social situations and 6 physical situations, again for both the free and forced choice options. A one-way ANOVA revealed a significant between group difference regarding social situations (for the free-response option only), $F(2,54) = 3.58$, $p < 0.05$, $r = 0.34$. Follow-up planned contrasts revealed no significant difference between clinical (ASD and non-ASD children with anxiety) and non-clinical children, however a significant difference was found in relation to the mean social free-response interpretations between the ASD-anxious and anxious groups, $t(54) = 2.58$, $p < 0.05$, with a medium-sized effect, $r = 0.33$. Children in the anxious group reported significantly higher levels of threat in social situations than the ASD-anxious children. No significant group difference was found for the social forced choice, $F(2,54) = 0.75$, $p > 0.05$, $r = 0.16$; and no differences were found for the physical free-response, $F(2,54) = 1.44$, $p > 0.05$, $r = 0.22$ or the physical forced choice, $F(2,54) = 0.16$, $p > 0.05$, $r = 0.08$. A comparison of avoidant responses also revealed no significant group differences, $F(2,54) = 1.79$, $p > 0.05$, $r = 0.25$.

Table 1

Mean free and forced choice child threat interpretation

	ASD-anxious (n = 19)	Anxious (n = 20)	Non-clinical (n = 18)
Total threat interp.			
Free response	3.2 (2.3)	4.6 (2.3)	3.0 (1.7)
Forced choice	2.4 (2.4)	2.5 (2.4)	3.0 (1.8)
Social threat interp.			
Free response	1.2 (1.2)	2.3 (1.6)	1.5 (1.0)
Forced choice	1.1 (1.2)	1.3 (1.4)	1.6 (1.1)
Physical threat interp.			
Free response	2.0 (1.4)	2.3 (1.6)	1.5 (1.4)
Forced choice	1.3 (1.3)	1.2 (1.4)	1.5 (1.2)
Solution			
Avoidant	1.2 (1.4)	1.6 (1.3)	0.8 (1.0)

Note. ASD = autism spectrum disorder. Standard deviations appear in parentheses.

Discussion

The aim of this study was to investigate the nature of interpretation bias towards threat in children with co-occurring ASD and anxiety as compared to typically developing children with anxiety. A significant difference was found in relation to threat interpretation across the three groups (ASD-anxious, anxious and non-clinical), with follow-up planned contrasts revealing no significant difference between clinical and

non-clinical children. However a significant difference was found between children with both ASD and anxiety as compared to typically developing children with anxiety, with ASD-anxious children reporting less threat interpretations, with a small-medium effect size. When ambiguous social and physical situations were considered separately, children with ASD and anxiety reported significantly less threat interpretations in social situations than children with anxiety only, while there was no significant difference in threat interpretation for physical situations across all groups. In interpreting this result it is important to note that while the clinical sample was heterogeneous with respect to anxiety disorders, the prevalence of social anxiety across both the ASD-anxious and anxious groups was similar, so it is unlikely that content specificity (Micco, Hirshfeld-Becker, Henin, & Ehrenreich-May, 2013) would account for the difference in social threat interpretation.

A possible explanation for less bias towards threat in the ambiguous social scenarios for children with ASD and anxiety may relate to differences in social cognition, and in particular a deficit in Theory of Mind (ToM). It has been suggested ToM deficiency is a central cognitive process associated with ASD (Baron-Cohen, 1997; Frith, 2001), and refers to impaired ability to attribute mental states (thoughts, emotions, beliefs) to other people, or in other words difficulty taking the perspective of another. It is possible ToM difficulties in some children with ASD may result in reduced threat perception in relation to social situations due to a lack of awareness of the intent and motivation behind the actions of other people. There is some evidence that people with ASD can present with general anxiety in social situations with limited fear of the social aspects of an interaction (Leyfer et al., 2006), however conversely many youth with ASD and anxiety do present with a fear of negative evaluation (White et al., 2015). It has been suggested ToM deficits can result in confusion and difficulty navigating social

situations which may result in increased general negative expectancies rather than FNE (Sharma et al., 2014; White et al., 2014), whereas ASD children with less impaired ToM may be more likely to show concern regarding negative evaluation by others (White et al., 2014).

There is evidence of variability in ToM across children with ASD which has been associated with a number of factors including age, language skills, and executive function (Kimbi, 2014). Furthermore, some children appear to develop explicit ToM over time through the use of compensatory strategies while deficits in spontaneous ToM ability remain (Senju, Southgate, White, & Frith, 2009). While the level of ToM impairment is variable amongst children with ASD, it is plausible that when such deficits are present they may influence potential threat appraisal associated with inferring the mental state of others, which was the basis of the task in the current study. Future research would benefit from the inclusion of an assessment of ToM to clarify the relationship between ASD, ToM deficits, anxiety and perception of social threat.

Another possible explanation for the current results may relate to the appropriateness or utility of the ambiguous situations experimental procedure as a measure of interpretation bias in children with ASD. As discussed, ToM deficits may influence the presence of social interpretation bias, but difficulties with ToM may also affect a child's ability to place themselves in a hypothetical situation. Children were presented with situations such as 'you see a group of students from another class playing a great game. When you walk over to join in they are laughing. Why would you think they are laughing?'. Theoretical models suggest deficits in ToM may underlie the observed lack of pretend play evident in many children with ASD (Frith, 2012), as well as difficulty taking the perspective of another. So it may be that non-threat responses were not indicative of a lack of threat bias, but rather a difficulty in comprehending the

task. It may be useful for future research to utilise other procedures such as homographs (Hadwin et al., 1997; Taghavi et al., 2000), performance-based measures (Rozenman et al., 2014) or possibly story stem (Dodd et al., 2012) to assess interpretation bias in the ASD population.

Further analysis of the plan of action children came up with in response to the ambiguous situation (assessed by asking the child what they would do) indicated no difference across groups with respect to avoidant solutions. This is in contrast to previous findings indicating anxious children typically identify more avoidant solutions as compared to non-clinical children (Barrett et al., 1996). Analysis of the current results regarding avoidant solutions indicate a similar effect size, in the same direction, as that found in Barrett et al. (1996) in relation to the anxious/non-clinical comparison, so a lack of power may explain the absence of differences between groups.

No significant between group differences were found with respect to the forced choice options across all measures and all groups. A possible explanation for this may relate to social desirability bias with children able to determine the 'correct' (i.e. non-threatening) explanation when given a choice of two options rather than indicating their actual threat interpretation. In the current study the child's initial free-response was more likely to indicate interpretation bias as compared to their forced-choice response. It is also possible question order impacted the response, with children asked to give their free-response first followed by the forced-choice. This may have given the child more time to think about their response and adjust according to the perceived 'correct' response. However this is in contrast to the findings of Barrett et al. (1996) who found no real difference between free and forced choice responses. It may be the current sample represented a more anxiety-literate group of children who were more able to identify the 'correct' response.

In addition to the potential limitations outlined above in relation to the use of ambiguous situations as a measure of interpretation bias in children with ASD, there are a number of other limitations associated with the current study. Firstly, an ASD symptom measure (ASRS-SF parent report) was included to provide support for the inclusion of participants in the ASD group, however the diagnosis of ASD relied on a previous diagnosis and was not independently verified. Therefore it is possible some children included in the ASD-anxious group were sub-threshold ASD. In addition, participants in the study were predominantly Caucasian and of relatively high socio-economic status so there are limits to the generalisability of these findings.

Limitations associated with sample size and subsequent power also appeared evident. The sample size calculations for the current study were made based on parental involvement data, and in hindsight the sample used may have been too small to adequately detect differences with respect to avoidant solutions to ambiguous situations. Based on the effect size in the current study, a sample of 96 would have been sufficient to detect a significant difference in avoidant solutions.

The current study did not find clear evidence of the presence of interpretation bias in children with ASD, however as discussed, the results need to be considered in light of possible power issues and potential limitations of the interpretation bias measure used. Of note is the finding that children with ASD and anxiety did not demonstrate interpretation bias in social situations particularly. Further research is needed with larger samples, utilising different measures of interpretation bias in order to determine the degree to which the cognitive model of anxiety, and in particular interpretation bias, can be applied as is to children with ASD, given potential differences in cognitive processes characteristic of ASD, particularly those related to social situations. It is possible social cognition deficits associated with ASD (Bauminger-Zviely,

2013) influence the nature of interpretation bias in social situations, with the current results reflecting a situation-specific deficit associated with ASD rather than a lack of cognitive bias. Future research would also benefit from the inclusion of a non-anxious ASD group to further understand the impact of ASD alone on cognitive biases. The current results point to the need to consider cognitive factors (such as ToM and threat perception) in the assessment, formulation and treatment of anxiety in children with ASD, rather than assuming they are the same as those found in typically developing children with anxiety.

Chapter 5

General Discussion

Introduction to General Discussion

The studies presented in this thesis extend the current knowledge of the nature of anxiety in children with ASD with respect to parent-child interaction and both parent and child cognitive factors. The results suggest similarities and differences between the current model of clinical anxiety and the presentation of anxiety in ASD. Parents of children with ASD and anxiety demonstrated significantly higher levels of parental involvement and fear of negative evaluation of their child (FNCE) as compared to parents of non-anxious children and parents of typically developing children with anxiety; indicating the presence of factors previously found to be associated with anxiety in typically developing children, but at significantly higher levels in children with ASD and anxiety. Analysis of child cognitive factors suggest a potential lack of interpretation bias in social situations for children with ASD and anxiety, which is in contrast to findings in typically developing children with anxiety, however these results should be interpreted with some caution. The following general discussion provides a more detailed account of the main findings, followed by the theoretical and clinical implications. Strengths and limitations of the studies are also discussed as well as suggested directions for future research.

Overview of findings

The first study, presented in Chapter 2, examined the nature of parent-child interactions with respect to parental overinvolvement and negativity in children with ASD and anxiety. As hypothesised, and consistent with previous research in typically developing children (Drake & Ginsburg, 2012; McLeod et al., 2007; Rapee, 2012; Wei & Kendall, 2014; Wood et al., 2003), parents of children with anxiety (both ASD and non-ASD children), demonstrated significantly higher levels of involvement as compared to non-anxious children. Further comparison of the anxious children revealed parents of

children with ASD and anxiety demonstrated even higher levels of involvement than parents of typically developing children with anxiety. In other words, parents of children with ASD and anxiety are more likely to step in and assist their child in a task, and also more likely to demonstrate higher levels of emotional involvement when speaking about their child as measured by the Five Minute Speech Sample (FMSS; Magana et al., 1986). Contrary to predictions, a comparison of parental negativity revealed no between group differences across all three groups. While there is evidence supporting a relationship between parental negativity and childhood anxiety (Gar & Hudson, 2008; Moore et al., 2004), others have found no evidence of a relationship (Beesdo et al., 2010; van Gastel et al., 2009), and it has been suggested there may be a stronger association with childhood depression (Beesdo et al., 2010; McLeod et al., 2007; Rapee, 1997).

The second study, presented in Chapter 3, explored parent-child interactions further to examine the relationship between parental anxiety, over-involvement and fear of negative child evaluation (FNCE) in children with ASD and anxiety. Consistent with preliminary evidence of an association between parental FNCE and childhood social anxiety (de Vente et al., 2011; Schreier & Heinrichs, 2010), the results of the second study revealed parents of anxious children (both ASD and typically developing children) had higher levels of FNCE as compared to parents of non-clinical children. Again further comparison amongst anxious children showed parents of children with ASD demonstrated significantly higher levels of FNCE than parents of typically developing children with anxiety.

Analysis of parent factors showed FNCE was associated with both parental anxiety and overinvolvement which is consistent with previous findings in relation to parental social anxiety (de Vente et al., 2011; Schreier & Heinrichs, 2010). In other

words, parents who reported higher levels of FNCE were more likely to be anxious themselves and more likely to demonstrate overinvolvement. It is important to note these results do not infer causality, particularly as the measures of parental anxiety and FNCE assessed similar, related constructs.

The second study also explored parent-reported reasons for intervening during the parent-child tangram task. Parents of children with ASD and anxiety were more likely to report they intervened to avoid their child experiencing negative emotion. This is consistent with the theory that parents may step in and become overinvolved in an attempt to reduce their child's distress (Hudson & Rapee, 2004) and parents of children with ASD may be more motivated to intervene given the increased likelihood of distress and problem behaviours (Davis et al., 2011; Evans et al., 2005; Farrugia & Hudson, 2006; White et al., 2009). Interestingly, parents of non-anxious children were more likely to report they believed their child did not need assistance, which effectively discouraged parental intervention, as compared to parents of anxious children.

The final study, presented in Chapter 4, examined the presence of interpretation bias towards threat in children with ASD and anxiety. Contrary to the large body of evidence supporting the presence of threat interpretation bias in typically developing children with anxiety (Hadwin et al., 2006), children with ASD and anxiety did not demonstrate greater threat interpretation bias than non-anxious children. Further analysis of ambiguous social situations only, indicated children with ASD and anxiety made significantly less threat interpretations in social situations as compared to typically developing children with anxiety. While methodological issues may have impacted the results, it is possible social cognition deficits associated with ASD may influence either the presence, or measurement, of interpretation bias.

Implications

Theoretical implications

The current findings have a number of theoretical implications, particularly in relation to anxiety models that emphasise the role of parent-child interaction (Chorpita & Barlow, 1998; Hudson & Rapee, 2004; Ollendick & Benoit, 2012). Parental overinvolvement is believed to play a role in the development and maintenance of anxiety in typically developing children and the findings from this thesis are the first to provide empirical evidence of the presence of parental overinvolvement in children with ASD and anxiety. While causality cannot be inferred due to the cross-sectional design, it is plausible that increased parental involvement is also associated with the development and maintenance of anxiety in children with ASD; and the nature of potentially anxiety-enhancing parent behaviours is likely to be complicated.

The significantly higher levels of parental overinvolvement found in the ASD group (as compared to the non-ASD anxious children) may also reflect the interaction between parental behaviour and child characteristics such as problem behaviour and impaired functioning. Parents may step in and help more frequently in an attempt to reduce a child's problem behaviour and distress, which may contribute to higher levels of involvement. Alternatively, in some instances parenting behaviours that look like overinvolvement in children with ASD and anxiety may in fact represent an appropriate level of support or scaffolding in response to impaired functioning in that context. Reaven (2011) refers to this required support/scaffolding as adaptive protection, which is contrasted with excessive protection, or overinvolvement. This concept of adaptive protection is likely to be an important differentiating factor when conceptualising anxiety-enhancing parenting behaviours in the ASD population and may be where

theoretical models of parent-child interaction and anxiety diverge, in a similar way to the proposed shared and unique factors described by Ollendick and White (2012).

The findings from this thesis also provide insight into parent cognitive factors associated with overinvolvement and anxiety in children. High parental fear of negative child evaluation (FNCE) found in the anxious group extends previous preliminary findings of the role of FNCE in the intergenerational transmission of social anxiety (de Vente et al., 2011; Schreier & Heinrichs, 2010) to other anxiety disorders as well. FNCE is believed to contribute to anxiety-enhancing parent behaviours, and potentially act as a mediator between parent and child anxiety (de Vente et al.; Schreier & Heinrichs).

The results also provide the first evidence of FNCE in ASD and anxiety and demonstrate a relationship between FNCE and overinvolvement. Levels of FNCE in ASD were almost twice that of parents of typically developing anxious children and again may reflect a response to child characteristics (both ASD and anxiety-related). Emerging theories of anxiety in ASD (Wood & Gadow, 2010) could be extended to incorporate anxiety-enhancing parent behaviours and the potential interaction between parent factors (such as FNCE and adaptive protection) and child factors (such as impaired functioning, problem behaviours and distress); which may in turn be additional factors contributing to the higher incidence of anxiety in children with ASD.

While the results in relation to child cognitive factors are preliminary and should be interpreted with some caution, there are potential theoretical implications associated with the *lack* of bias towards threat interpretation in social situations for children with ASD and anxiety. This is despite an emphasis on cognitive bias as a fundamental mechanism in the development and maintenance of anxiety according to cognitive models of anxiety (Beck & Clark, 1997; Muris & Field, 2008); and empirical evidence of a bias towards threat in typically developing children with anxiety (Hadwin et al., 2006).

While conclusions should be tentative, the current result may reflect social cognitive impairments associated with ASD, which points to the obvious need to consider the level and impact of social cognitive impairments (such as ToM) when conceptualising cognitive bias in models of anxiety in ASD. It seems plausible that an inverse relationship exists between ToM impairment and cognitive interpretation bias in social situations and may be a possible explanation for the pattern of results found. However this premise may only hold true for interpretations related to inferring the actions and mental state of others, whereas negative interpretations regarding social confusion and overstimulation for example may have the opposite relationship. That is, increased social cognitive impairment may be associated with increased bias towards threat in these situations. Clearly further research is needed to tease apart the relationship between cognitive bias and impaired social cognition.

Clinical implications

In addition to the theoretical implications outlined above, the results have a number of clinical implications. Clinically, a better understanding of parent-child interaction in children with ASD and anxiety is important given the increased and ongoing involvement parents have, often over the lifetime of their child (Myers & Johnson, 2007; National Research Council, 2001; Reaven, 2011) and the potential role parenting behaviours play in the maintenance and amelioration of anxiety. ASD-specific anxiety management programs incorporate parent-based interventions (Chalfant et al., 2011; Reaven et al., 2011), so it is important to provide empirical support for the theory underlying clinical practice.

The current finding of high parental overinvolvement in ASD and anxiety lends some empirical support to the inclusion of a parent-based component in anxiety intervention to address the high overinvolvement. However, the nature of this

intervention should be considered in light of the differences found between ASD and non-ASD children. Parents of children with ASD and anxiety were generally even more overinvolved but as noted previously, the results may reflect a combination of overinvolvement and adaptive protection in response to the child's needs. As discussed by Reaven et al. (2011), clinically it is important to assist parents in making the distinction between required support and overinvolvement, which is an ongoing process as a child develops. Common early intervention strategies for ASD such as forewarning and preparation are used to reduce uncertainty and distress that can arise in response to change (Prior et al., 2011), however it is easy to see how these practices can become entrenched over time and become more support than the child actually needs.

Parental overinvolvement was also associated with FNCE, which was significantly higher in the ASD/anxious group. This finding suggests parent cognitive factors could also be a focus of parent-based interventions targeting anxiety - helping parents understand and be aware of the presence of FNCE and it's potential relationship with parenting behaviours such as overinvolvement. Intervention may involve cognitive restructuring to help parents test out their beliefs about their child's behaviour and the response from others.

Finally, there are clinical implications for the lack of interpretation bias towards social threat found in children with ASD and anxiety. While this finding needs to be replicated, it may be that individual differences in social cognitive impairment associated with ToM deficits, as well as the nature of the social interaction, impact the level of threat interpretation. The assumption has been made to simplify cognitive components of ASD-specific anxiety treatment programs (Chalfant et al., 2011), however it may be that the complexity of a child's cognitions is variable depending on context. Given these potential individual differences, clinically it is likely to be helpful to assess

degree of social cognitive impairment (in particular ToM), and to gain an understanding of the exact nature of the perceived threat before embarking on cognitive restructuring.

Strengths of the present research

The studies presented in this thesis have a number of strengths. The current studies replicate experimental designs used in studying typically developing children with anxiety and are the first to examine parent-child interaction in children with ASD and anxiety, specifically overinvolvement and negativity. As such, the findings contribute to a further understanding of the similarities and differences between anxiety seen in ASD and clinical anxiety in typically developing children. A further strength associated with the study design is the use of multiple methods of data collection including observation, rather than a reliance on current or retrospective self-report; and a structured diagnostic interview for the assessment of anxiety as well as self-report anxiety symptom measures to provide further indication of symptom severity.

Another strength of the research is the novel design used to explore parent-reported reasons for involvement. Parents were asked to give feedback on their thought process while watching a video of the interaction with their child. The design allowed for immediate feedback on cognitive factors that influenced a parent's behaviours, to gain a better understanding of the process that underlies behaviours such as involvement, as well as the thought processes that prevent a parent from intervening. The current studies are also the first to examine interpretation bias towards threat in children with ASD and anxiety, following a large body of research demonstrating an association between threat interpretation and anxiety in typically developing children (Hadwin et al., 2006). While further replication is needed, the current results contribute to an understanding of potential differences in relation to the cognitive model of anxiety,

suggesting the presence of interpretation bias in ASD may be influenced by context and type of information presented.

Limitations of the present research

Notwithstanding the strengths of the studies that comprise this thesis, there are also limitations that should be considered. Given the same sample was used for all three studies, limitations associated with the sample composition are relevant across all studies. Firstly the ASD diagnosis was not independently verified so it is possible some children were sub-threshold ASD, however the Autism Spectrum Rating Scales Short Form (ASRS-SF) parent-report questionnaire was administered to provide further verification of the presence of ASD symptoms and support inclusion in the ASD group. A comparison group of non-anxious children with ASD only would have been helpful to assist in discriminating between factors associated with ASD only as compared to ASD and comorbid anxiety. It should also be noted there are limits to the generalisability of results with respect to cognitive ability as children with ASD were excluded if they performed more than 2 standard deviations below the mean on IQ tests.

There are also limits to generalisability associated with the sample composition. Firstly, the two clinical groups were predominantly treatment-seeking families which may have impacted results, particularly in relation to parental involvement. Secondly, given the primarily Caucasian background of participants and relatively high socio-economic status. Finally, there are limitations associated with the size of the sample. The sample size was calculated based on parent-child interaction studies, however in hindsight the sample lacked power with respect to some aspects of the threat interpretation study.

Potential limitations are also associated with the measures used. While no measures were validated for use in the ASD population, their use was necessitated by a

lack of ASD-validated instruments, and they provide the best alternative at this point. However it is possible some of the measures may not have accurately assessed the desired constructs. For example, overinvolvement measures may have also picked up adaptive protection, and the threat interpretation method may not have been appropriate given potential difficulty understanding the task due to possible impaired ToM. Finally, it is important to note the cross-sectional study design means it is not possible to determine the direction of effect between variables, therefore causality can not be inferred.

Directions for future research

While research on the nature of anxiety in children with ASD has increased exponentially in recent years, our understanding is still in its infancy. The findings from this thesis highlight a number of directions for future research, particularly in light of the preliminary nature of the results which require replication. The cross-sectional design of the current studies does not demonstrate causality and therefore longitudinal or experimental research is needed to examine the direction of effect. Evidence suggests a reciprocal relationship exists between child anxiety and parental involvement in typically developing children (Edwards, Rapee, & Kennedy, 2010) and while it is likely to also be the case for children with ASD and anxiety, this requires empirical validation. Longitudinal research would also assist in determining the nature of the relationship between FNCE and parenting behaviours, particularly whether there is a reciprocal relationship between FNCE and parenting behaviours. de Vente et al. (2011) suggest a reciprocal relationship may exist whereby FNCE contributes to overinvolvement, and the reverse may also be true with overinvolvement maintaining FNCE by strengthening the belief that the child will be evaluated negatively if the parent does not step in.

The current results also highlight the need for new experimental designs and measures to capture potential differences within the construct of overinvolvement - in particular to tease apart required parental support from excessive intervention. For example, the tangram task used in this thesis could be modified to include a comparison between a child-parent dyad, and a child-researcher dyad, or even an ASD child with a non-ASD parent, to provide an indication of actual support needed. Observational designs could also be used to examine the interaction between ASD characteristics, anxiety and child behaviour - and the impact this has on parenting responses; for example, observing both parent *and* child behaviours to determine if child behaviours or distress elicit parent responses.

Further research is needed to understand how FNCE manifests behaviourally and whether it has the potential to influence a child's appraisal of threat. For example, children have been found to use parent response/ behaviour to determine the level of threat in a situation (Morren et al., 2008), so it is possible that parent behaviour as a result of FNCE may provide the child with more threat information.

The results suggest children with ASD and anxiety do not exhibit threat-based interpretation bias in social situations, however replication of these findings is necessary before theoretical conclusions can be drawn regarding interpretation bias in ASD and anxiety. Furthermore, the nature of cognitive bias in social situation needs further exploration to determine whether it is impacted as suggested by impaired ToM. Finally, in order to generalise the current results beyond children with high functioning autism, future research is warranted with children with more severe ASD and co-occurring anxiety; and as noted previously, future research will benefit from the inclusion of an ASD-only comparison group to gain an understanding of which factors are relevant to ASD alone as well as the ASD-anxiety combination.

Summary and conclusions

In conclusion, the findings from this thesis provide the first empirical support for the presence of parental overinvolvement in children with ASD and anxiety, a parenting behaviour considered to play a role in the development and maintenance of anxiety. Overinvolvement is significantly higher in ASD and anxiety, and is likely to be complicated by the interaction with ASD characteristics, in particular the distinction between required and excessive support, and child behaviour and distress. The findings from the second study provided insight into FNCE, a parent cognitive process associated with overinvolvement, as well as parent and child anxiety. FNCE may be found to contribute to the higher levels of involvement found in ASD and anxiety and may be a target for parent-based interventions for child anxiety. Contrary to expectations, the final study indicated a lack of interpretation bias towards threat in social situations for children with ASD and anxiety, which requires replication, but may indicate a further difference associated with the interaction between anxiety and ASD. Comorbidity amongst ASD is the norm rather than the exception and can cause significant additional impairment beyond ASD, therefore further research is needed to continue to inform and shape assessment, formulation and treatment of anxiety.

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Appendix A

Parent Review of Tangram Coding Manual

Parent Review of Tangram Coding Manual

Overview

The Tangram Task is a puzzle task completed by the parent and child for five minutes. Following completion of the tangram task with their child, the parent is asked to watch the video recording of the task.

The parent is given the following instructions:

"We are interested in finding out why parents intervene at a particular time. As you watch the video please explain to me what you were thinking as you worked with your child to complete the task."

Code each 5-minute transcript of the parent's comments while watching the video based on the following 5 codes. Codes are identified as being present or absent in the transcript.

1. Helping to avoid negative emotion
2. Help child to engage/attend
3. Child does not want help
4. Parent wants child to complete on own
5. Parent awareness of over-involvement

Note: Only code comments that refer to the current task, not comments that refer to what the parent would usually do, or has done in the past.

1. Helping to avoid negative emotion

This code indicates the parent decided to help the child in order to avoid or reduce the chances of the child feeling negative emotions. The parent may have commented that they could see the child was feeling bad, or they anticipated the child would start to feel bad. The parent may have also commented that the child would have given up the task as a result of frustration/anger for example, if they did not intervene.

Examples of comments that indicate the presence of this code include:

"I can see I'm doing things around how he's feeling"
"I want her not to feel frustrated"
"I decided to help because she was losing confidence"
"I didn't want him to get upset"
"I know he's just had enough"

2. Help child to engage/attend

This code indicates the parent made the decision to help in order to assist the child in getting started with the task or paying attention to the task. You may get the sense from the parent that the child was struggling or would have found it difficult to get started without the parent's help. The parent may also comment that they believe the child has lost interest in the task.

Examples of comments that indicate the presence of this code include:

"I gave her some help to try and keep her interest"
"I wanted to get him back into it"
"I could see he was having trouble, that's why I did help in the beginning"
"I suggested to try that one, so I could get her started"
"I wanted to get her going"

3. Child does not want help

The parent makes a comment that indicates the child does not want the parent to help. The parent may comment that the child has said this explicitly, or the parent may infer this based on the child's actions or demeanor.

Examples of comments that indicate the presence of this code include:

"She doesn't want me helping at all"
"He was kind of stubborn, and wanted to do it his way"
"I knew if I started picking up the pieces she'd start getting annoyed with me"

4. Parent wanting their child to complete on own

The parent indicates they made a decision not to help their child, and wanted them to do it on their own. This factor is still coded as present regardless of whether the parent goes on to provide help as the task continues.

Examples of comments that indicate the presence of this code include:

"You can see he's working it out so I wanted to leave him"
"I didn't tell him it was wrong, I just thought you'll figure it out"
"I want to help her there, but I'm not going to"

5. Parent awareness of over-involvement

The parent may explicitly refer to helping or intervening too much.
In other cases the parent may not explicitly say they have helped too much, but you get the sense that they feel they have intervened more than they should. The parent may realise their behaviour was influenced by how *they* wanted the puzzle to be completed.

This code refers to parent awareness of over-involvement during the task, <u>not</u> a reference to usual or previous parent behaviour.

Examples of comments that indicate the presence of this code include:

"I wanted it done this way, but I guess that's not the only way"
"Maybe I shouldn't have said anything and just let him do it"
"I gave her quite a bit of help really"
"It sounds like I'm helping him so much"
"I can see I'm being a bit pedantic, I want it perfect"

Appendix B

Final Ethics Approval

From: "Ethics Secretariat" <ethics.secretariat@mq.edu.au>
Date: 12 December 2012 at 11:58:49 AM AEDT
To: "Dr Heidi Lyneham" <heidi.lyneham@mq.edu.au>
Cc: "A/Prof Jennie Hudson" <jennie.hudson@mq.edu.au>, "Mrs Anna Kelly" <annakelly@bigpond.com>
Subject: Approved- Ethics application- Lyneham (Ref No: 5201200790)

Dear Dr Lyneham

Re: "Parent-child interaction in children with Autism Spectrum Disorders and anxiety" (Ethics Ref: 5201200790)

Thank you for your recent correspondence. Your response has addressed the issues raised by the Human Research Ethics Committee and you may now commence your research.

This research meets the requirements of the National Statement on Ethical Conduct in Human Research (2007). The National Statement is available at the following web site:

http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/e72.pdf.

The following personnel are authorised to conduct this research:

A/Prof Jennie Hudson
Dr Heidi Lyneham
Mrs Anna Kelly

NB. STUDENTS: IT IS YOUR RESPONSIBILITY TO KEEP A COPY OF THIS APPROVAL EMAIL TO SUBMIT WITH YOUR THESIS.

Please note the following standard requirements of approval:

1. The approval of this project is conditional upon your continuing compliance with the National Statement on Ethical Conduct in Human Research (2007).

2. Approval will be for a period of five (5) years subject to the provision of annual reports.

Progress Report 1 Due: 12 December 2013
Progress Report 2 Due: 12 December 2014
Progress Report 3 Due: 12 December 2015
Progress Report 4 Due: 12 December 2016
Final Report Due: 12 December 2017

NB. If you complete the work earlier than you had planned you must submit a Final Report as soon as the work is completed. If the project has been discontinued or not commenced for any reason, you are also required to

submit a Final Report for the project.

Progress reports and Final Reports are available at the following website:

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/forms

3. If the project has run for more than five (5) years you cannot renew approval for the project. You will need to complete and submit a Final Report and submit a new application for the project. (The five year limit on renewal of approvals allows the Committee to fully re-review research in an environment where legislation, guidelines and requirements are continually changing, for example, new child protection and privacy laws).

4. All amendments to the project must be reviewed and approved by the Committee before implementation. Please complete and submit a Request for Amendment Form available at the following website:

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/forms

5. Please notify the Committee immediately in the event of any adverse effects on participants or of any unforeseen events that affect the continued ethical acceptability of the project.

6. At all times you are responsible for the ethical conduct of your research in accordance with the guidelines established by the University. This information is available at the following websites:

http://www.mq.edu.au/policy/

http://www.research.mq.edu.au/for/researchers/how_to_obtain_ethics_approval/human_research_ethics/policy

If you will be applying for or have applied for internal or external funding for the above project it is your responsibility to provide the Macquarie University's Research Grants Management Assistant with a copy of this email as soon as possible. Internal and External funding agencies will not be informed that you have final approval for your project and funds will not be released until the Research Grants Management Assistant has received a copy of this email.

If you need to provide a hard copy letter of Final Approval to an external organisation as evidence that you have Final Approval, please do not hesitate to contact the Ethics Secretariat at the address below.

Please retain a copy of this email as this is your official notification of final ethics approval.

Yours sincerely
Dr Karolyn White
Director of Research Ethics
Chair, Human Research Ethics Committee