

UNDERSTANDING MECHANISMS THAT MAY UNDERLIE THE DEVELOPMENT
AND MAINTENANCE OF ANXIETY IN CHILDREN AND ADOLESCENTS:
COGNITIVE BIASES AND PARENTING BEHAVIOURS

BY
LAUREN CLAIRE BRYCE

A thesis
submitted to Victoria University of Wellington in fulfilment of the requirements for the
Degree of Doctor of Philosophy

School of Psychology
Faculty of Science
Victoria University of Wellington
August 2017

Abstract

Anxiety is one of the most common forms of psychopathology in children and adolescents. Understanding the mechanisms that underlie the development and maintenance of this disorder is therefore critical. A variety of factors that interact with one another are likely to contribute to the risk and perpetuation of anxiety in young people. Moreover, risk and maintaining factors can occur at both an individual and environmental level. Cognitive biases are one such factor occurring at an individual level that are investigated in Study 1 and Study 2 of this thesis. Cognitive biases are also predicted to have associations with particular kinds of parenting behaviours, and Study 3 investigated these parenting behaviours. Study 3, therefore, provides a bridge between individual level cognitive mechanisms and possible environmental contexts that may contribute to the risk and maintenance of anxiety in young people.

In Study 1, the relationships amongst anxiety, interpretation bias, and memory bias were investigated in children ($M = 10.1$ years, $SD = 0.8$). Children with higher levels of anxiety exhibit interpretation biases; a tendency to interpret ambiguous information in a negative manner. Moreover, interpretation biases are predicted to create negative memories for ambiguous information. In Study 1, 62 children heard ambiguous information about a novel animal and their interpretation and recall for this information was assessed. Interpretation bias was significantly associated with memory bias; children who interpreted the ambiguous information in a negative way also reported a greater number of negative memories for this information. Children with higher levels of anxiety also reported a greater number of negative memories.

In Study 2 the relationship between interpretation bias and memory bias was investigated within an experimental paradigm, to understand whether there was evidence for a causal relationship between these cognitive biases. Children ($M = 9.7$ years, $SD = 1.1$) heard a series of ambiguous vignettes, and each vignette was followed by either a *negative* or a *benign* interpretation. Children were subsequently asked to recall the vignettes and children who had heard negative interpretations reported a greater number of negative memories. Children with higher levels of anxiety also reported a greater number of negative memories in their recall of the ambiguous vignettes.

In Study 3, I investigated parental autonomy restriction and support in the context of parent-adolescent ($M = 15.3$ years, $SD = 0.8$) conversations, and their associations with anxiety, interpretation biases, and parental attributions. Higher levels of parental autonomy restriction may contribute to the risk and maintenance of anxiety in young people by

signalling that the world is dangerous. Sixty-four mother-adolescent dyads were asked to discuss a recent conflict, and from this interaction maternal autonomy restriction and autonomy support were assessed. Adolescents with higher levels of anxiety and adolescents who exhibited interpretation biases to a greater extent, had mothers who demonstrated a greater amount of autonomy restriction within the conversations. Yet maternal variables were not significantly associated with either autonomy restriction or support. The results support predictions that these characteristics of young people may determine the extent of autonomy restriction parents engage in. In turn, autonomy restrictive parenting behaviours potentially play a role in the risk and maintenance of cognitive biases and anxiety.

Overall this thesis contributes to an understanding of the complex and multiple relationships amongst factors that may be involved in the aetiology and perpetuation of anxiety in young people.

Acknowledgements

First, I would like to thank all of the people who gave their time to participate in my research; I am very grateful for this. Moreover, this research would not have happened without the help from principals, teachers, and administrative staff who generously gave their time and resources in order for me to conduct research within their schools. Thank you to parents who gave consent for their children to take part. Thank you to adolescents and mothers who allowed us to come into their homes to carry out this research.

A special thank you to my primary supervisor, Associate Professor Karen Salmon, who has provided her expertise, guidance, support, feedback, and ideas throughout this journey. Thank you to my secondary Supervisor, Professor David Harper, who also provided useful advice, ideas, and feedback on drafts when this was needed.

This research would also not have possible without the generous financial support from Victoria University PhD and submission scholarships, FSRG travel grants, Maurice and Phyllis Paykel Trust travel grant, the NZCCP travel grant, and the Marsden Fund.

Thank you to all the members of Karen's lab who have been supportive and have also contributed useful ideas along the way. Also, I am very grateful for everyone who contributed their time to my PhD through data collection and reliability coding; those were big jobs and would not have happened without you!

A special thank you to Charlotte and Tim, who have not only been amazing colleagues but amazing friends throughout this. Thank you for all the laughter, weirdness, advice, and ideas.

Thanks to Lynley and Ellen who have been so supportive and provided me with much needed fuel (i.e., food) to make it to the finish line. Alex also deserves a mention for providing me with chocolate.

Charlie, thank you for your love, moral support, letting me rant when I needed to, and for proofreading my references (albeit while lounging on a beach in Thailand).

Finally, I would like to dedicate this thesis to my Mum and my Dad. Thank you for all your love and support over the years. Dad, I know you would have been proud.

Contents

Chapter 1: General Introduction	1
Symptoms, Subtypes, and Developmental Patterns of Anxiety	1
Aetiological and Maintaining Factors Involved in Anxiety	4
Cognitive Biases and Anxiety in Young People	7
Parenting Behaviours and Anxiety in Young People	9
Overall Conclusions and Major Aims of the Research Conducted in this Thesis	13
Chapter 2: Cognitive Biases and Anxiety in Young People	17
The Relationship between Anxiety and Interpretation Bias in Young People	17
The Relationship between Anxiety and Memory Bias	25
Overall Conclusions	32
Aims and Hypotheses for Study 1	33
Method	34
Participants	34
Materials	34
Measures and Tasks	35
Procedure	37
Coding	38
Results	39
Data Analysis Strategy	39
Descriptive Statistics and Preliminary Analyses	40
Main Analyses	41
Discussion	45
Results in Relation to the Hypotheses	45
Post Hoc Findings	48
Limitations and Future Directions	49
Conclusions	50
Chapter 3: Do Interpretation Biases Cause Memory Biases for Ambiguity?	51
The Relationship between Interpretation Bias and Memory Bias	51
Overall Conclusions	54
Method	56
Participants	56
Measures	56

Materials.....	56
Design.....	57
Procedure.....	58
Coding for Recall of Vignettes and Interpretations.....	60
Results.....	61
Descriptive Statistics and Preliminary Analyses.....	61
Analyses Testing the Hypotheses.....	63
Discussion.....	65
Limitations and Future Research.....	68
Conclusions.....	69
Chapter 4: Parental Behaviours Implicated in the Development and Maintenance of Anxiety in Young People; A Literature Review.....	71
Autonomy Restriction and Autonomy Support: Definitions and Theories.....	72
Research Findings Regarding Autonomy Restriction, Autonomy Support, and Anxiety In Young People.....	75
Parental Anxiety and Attributions Regarding Interpretation Biases.....	78
Parental Autonomy Restriction, Autonomy Support, and Interpretation Biases in Young People.....	79
Overall Conclusions.....	79
Chapter 5: Parental Autonomy Restriction and Autonomy Support within Parent-Child Conversations.....	81
Autonomy Support in Conversations about Hypothetical Scenarios.....	83
Autonomy Support and Autonomy Restriction within Parent-Child Conversations about Emotion-Eliciting Events.....	84
Overall Conclusions.....	86
The Current Study.....	87
Method.....	89
Participants and Recruitment.....	89
Questionnaire Measures.....	90
Tasks.....	90
Procedure.....	91
Coding and Reliability.....	92
Results.....	95
Data Reduction and Analysis Strategy.....	95

Descriptive Statistics for the Key Variables.....	95
Data Analysis Strategy for Hypotheses Group 1 and Hypotheses Group 2.....	98
Post Hoc Analyses with Adolescent Depression.....	103
Discussion.....	106
Hypotheses Group 1: Relationships Amongst Maternal Anxiety, Maternal Attributions, Autonomy Support, and Autonomy Restriction.....	106
Hypotheses Group 2: Relationships Amongst Adolescent Anxiety, Interpretation Biases, Autonomy Support, and Autonomy Restriction.....	107
Hypotheses Group 3: Models Including Both Adolescent and Maternal Characteristics	109
Relationships Identified Post Hoc.....	110
Limitations and Future Research.....	111
Conclusions.....	112
Chapter 6: General Discussion.....	113
Study 1 and Study 2: Relationships Amongst Anxiety, Interpretation Biases, and Memory Biases in Children.....	113
Study 3: Anxiety and Interpretation Biases in the Context of Mother-Adolescent Conversations.....	115
The Relationship between Anxiety and Interpretation Bias; Inconsistent Evidence.....	117
Final Conclusions.....	118
References.....	120
Appendices.....	141

List of Figures

Figure 1.1	Transactional model of factors involved in the development, maintenance, and amelioration of anxiety in childhood.....	5
Figure 1.2	Factors proposed to be involved in the maintenance of anxiety in childhood.....	6
Figure 1.3	Parenting pathways to child anxiety.....	12
Figure 3.1	Procedure outline (Study 2).....	59
Figure 5.1	Conceptual model of maternal anxiety and adolescent anxiety predicting maternal autonomy restriction and autonomy support within the mother-adolescent conversations (Study 3).....	89
Figure 5.2	Conceptual model of maternal anxious attributions and adolescent interpretation biases predicting maternal autonomy restriction and autonomy support within the mother-adolescent conversations.....	89
Figure 5.3	Frequency distribution of maternal anxiety scores.....	97
Figure 5.4	Path analysis: Maternal anxiety and adolescent anxiety predicting autonomy support and autonomy restriction.....	103
Figure 5.5	Path analysis: Maternal anxious attributions and adolescent interpretation biases predicting autonomy support and autonomy restriction.....	103

List of Tables

Table 2.1	Studies that have Investigated the Relationship between Anxiety and Interpretation Bias in Young People	18
Table 2.2	Descriptive Statistics for All Variables (Study 1).....	41
Table 2.3	Correlations between Key Variables (Study 1).....	43
Table 2.4	Bootstrapped BCa Confidence Intervals (95%) for the Effect Sizes in Table 2.3.....	44
Table 3.1	Descriptive Statistics for Key Variables (Study 2).....	62
Table 3.2	Correlations between Key Variables (Study 2).....	63
Table 3.3	Regression for the Interpretation Condition and Anxiety Predicting Negative Memories (Study 2).....	65
Table 5.1	Summary of Research on Parental Autonomy Restriction and Autonomy Support within Parent-Child Conversations.....	82
Table 5.2	Descriptive Statistics for Key Variables (Study 3).....	96
Table 5.3	Pearson Correlation Coefficients between Maternal Anxiety and Key Variables when Dyad with Maternal Anxiety Outlier is Retained or Removed.....	97
Table 5.4	Pearson Correlation Coefficients for Key Variables (Study 3).....	100
Table 5.5	Bootstrapped and Bias-Corrected (95%) Confidence Intervals for Correlation Coefficients in Table 5.4.....	101
Table 5.6	Correlations between Adolescent Depression (with outlier) and Key Variables; Bootstrapped and Bias-Corrected (95%) Confidence Intervals Shown in Parentheses.....	105
Table 5.7	Correlations between Adolescent Depression (without outlier) and Key Variables; Bootstrapped and Bias-Corrected (95%) Confidence Intervals Shown in Parentheses.....	105

Chapter 1: General Introduction

Anxiety is one of the most common forms of psychopathology experienced by young people. Indeed, meta-analyses have demonstrated up to 12.3% of young people experience high levels of anxiety that interfere with their daily lives (Costello, Egger, Copeland, Erkanli, & Angold, 2011). Anxiety also frequently co-occurs with other disorders, such as mood disorders and substance abuse (Bittner, Egger, Erkanli, Costello, Foley, & Angold, 2007; Caron & Rutter, 1991; Russo & Beidel, 1994). Moreover, anxiety in young people often temporally precedes co-occurring psychopathologies, raising the possibility that providing early interventions may prevent the subsequent development of further psychological difficulties (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Kessler, Ruscio, Shear, & Wittchen, 2009; Kushner, Abrams, & Borchardt, 2000; Moffitt, Caspi, Magdol, Silva, & Stanton, 1996).

Anxiety can have a profound impact in the lives of young people. Interference in everyday functioning can occur across multiple domains and commonly manifests as avoidance of situations that are perceived as threatening. For young people, this can result in marked academic and social difficulties (Fonseca & Perrin, 2001; Muris & Field, 2011; Vasey & Dadds, 2001). In addition to causing interference, anxiety is inherently distressing and unpleasant. The inherently distressing nature of anxiety, high prevalence, and interference in daily life warrants a deeper knowledge of the aetiological and maintaining factors associated with this disorder.

For the purposes of this thesis the term “children” is used when referring to theoretical predictions in order to maintain consistency with the terminology used in these theories. Many theories of anxiety use the term “children” even when referring to both children and adolescents. To identify participant groups in research, the term “children” is used to refer to participants up to the age of 12 years, “adolescents” is used for participants between the ages of 13-18 years, and “young people” includes both. The term “parent-child interaction” is used to describe any kind of interaction that occurs between young people (i.e., up to the age of 18 years) and their parents.

Symptoms, Subtypes, and Developmental Patterns of Anxiety

Anxiety manifests in clusters of interrelated psychological, physiological, and behavioural symptoms. The typical psychological components of anxiety involve threat cognitions, catastrophising, and a perception of being unable to cope with a perceived threat (Ollendick, Grills, & Alexander, 2001). The physiological and behavioural reactions associated with anxiety represent an adaptive response that prepares us to escape dangers

(Wood & Eagly, 2002). Although there are a wide array of physiological symptoms, some of these are heart palpitations, dry mouth, nausea, muscle tension, sweating, and trembling (Oyebode, 2008). The behavioural component of anxiety is often elicited in response to the physiological and psychological symptoms and most often involves avoidance of perceived threats, or plans to do so.

While there are common features, anxiety is elicited in response to different kinds of stimuli for different people. This is reflected in the major subtypes of anxiety disorders that are recognised by *The Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-V: American Psychiatric Association, 2013). The major subtypes are: separation anxiety, selective mutism, social anxiety, generalised anxiety, specific phobia, panic disorder, and agoraphobia. Although anxiety is partitioned into these groups, there are high levels of comorbidity in young people and adults, meaning that there is a high chance that an individual will experience more than one subtype simultaneously (Kessler, Chiu, Demler, & Walters, 2005; Magee, Eaton, Wittchen, McGonagle, & Kessler, 1996; Rapee, Schniering, & Hudson, 2009). Moreover, young people experiencing different anxiety subtypes have also been shown to have a similar response to treatment when they receive generic interventions (Rapee, 2000; Rapee et al., 2009) suggesting that the maintaining factors may be similar across these subtypes.

Anxiety subtypes also show developmental patterns in their emergence. Selective mutism and separation anxiety tend to occur during early childhood, specific phobias often emerge during middle to late childhood, and social anxiety becomes more prevalent during middle childhood to early adolescence. Panic disorder and agoraphobia typically have their onset during adolescence or adulthood (Costello, Egger, Copeland, Erklani, & Angold, 2011). A small increase in the overall prevalence of anxiety disorders from childhood through to adolescence may be partly attributable to higher levels of panic disorder, generalised anxiety disorder, and agoraphobia (Canino et al., 2004; Ford, Goodman, & Meltzer, 2003; Rapee et al., 2009). While these subtypes may show an overall increase in prevalence, the rates of separation anxiety and specific phobias have been shown to decrease in early adolescence (Breton et al., 1999).

These patterns of subtype emergence correspond to developmental patterns of normative fears and worries in young people. Fears and worries are common in young people, but may be considered developmentally normative as they are highly prevalent and tend to dissipate over time (Gullone, 2000; Gullone & King, 1997; Muris, Merckelbach, Gadet, & Moulaert, 2000; Muris, Merckelbach, Ollendick, King, & Bogie, 2001; Muris,

Verweij, & Meesters, 2003). Fears and worries track young people's physical, social, and cognitive development. For instance, a fear of strangers becomes more prevalent for preschool children as they begin to become more mobile and explore their environment (Ollendick et al., 2001). In the early to middle school years, children may experience fears and worries regarding specific objects, natural disasters, and illness or bodily injury, which occur alongside children's ability to anticipate future events. Performance and school worries are more commonly found in late childhood as formal assessments and social relationships become more salient (Westenberg, Drewes, Goedhart, Siebelink, & Treffers, 2004). Adolescence is generally characterised by social evaluation worries, as adolescents move further into the social world (Boyer & Bergstrom, 2011). Adolescents may also experience existential worries as the capacity for abstract thought and self-awareness increases (Beesdo, Knappe, & Pine, 2009; Gullone & King, 1993).

For most young people, these fears and worries are transient and dissipate as the ability to manage, control, and understand situations develops (Ollendick, Yule, & Ollier, 1991). For some young people, however, fears and worries may begin to interfere with daily functioning and cause significant distress (Muris & Field, 2011; Muris & Merckelbach, 2000; Muris, Merckelbach, Mayer, & Prins, 2000). Craske (1997) states that fears and worries that persist and interfere with daily life, develop into anxiety disorders. Craske (1997) also proposes that young people's predisposition towards anxiety along with parent-child interactions that reinforce anxiety, can disrupt the dissipation of fears and worries that would normally occur.

In addition to developmental patterns with age, many studies have also reported gender differences in the prevalence of anxiety. Women and girls have been shown to experience higher rates of anxiety and fears than men and boys (Costello et al., 2003; McLean & Anderson, 2009). In adults, epidemiological research has shown that lifetime prevalence of anxiety disorders is higher in women than men across most subtypes (Fredrikson, Annas, Fischer, & Wik, 1996; Hettrema, Prescott, Myers, Neale, & Kendler, 2005; Kringlen, Torgersen, & Cramer, 2001; Vicente et al., 2006). This pattern is similar for young people. Girls have been shown to experience higher rates of anxiety disorders and may also experience a greater severity of anxiety symptoms (Almqvist et al., 1999; Lewinsohn, Gotlib, Lewinsohn, Seeley, & Allen, 1998; Spence, 1998). During childhood, girls also report fears and worries to a greater extent than boys (Muris, Merckelbach, Meesters, & Van Lier, 1997; Ollendick, King, & Frary, 1989; Ollendick, Matson, & Helsel, 1985). Interactions between inherited vulnerabilities, environmental factors, and parenting behaviours, have been

implicated in gender differences in the prevalence of anxiety (Adams, Kuebli, Boyle, & Fivush, 1995; Chaplin, Cole, & Zahn-Waxler, 2005; Gallagher, 2002; Hettema et al., 2005; Krohne & Hock, 1991; McLean & Anderson, 2009). Theories regarding the multiple pathways that may contribute to anxiety in young people are presented further in this chapter.

In summary, anxiety is inherently distressing and can cause marked interference in young people's lives. Anxiety disorders may be the result of normative fears and worries that have persisted rather than dissipated. Inherited vulnerabilities and environmental factors likely play a role in the persistence of fears and worries in young people. In the remainder of this chapter, I outline theories of factors involved in the risk and perpetuation of anxiety in young people. These theories provide a context for introducing the major aims of this thesis.

Aetiological and Maintaining Factors Involved in Anxiety

Vasey and Dadds' (2001) transactional model of childhood anxiety predicts that children's cumulative risk for anxiety is determined by the relative number of protective factors to predisposing factors (Figure 1.1). A broad range of predisposing and protective factors are suggested by Vasey and Dadds (2001) that include but are not limited to: genetic factors, neurobiology, temperament, cognitive biases, early control experiences, parental responses, and level of exposure to feared stimuli. Predisposing and protective factors are predicted to be dynamic and can change over time, which in turn influences children's cumulative risk.

There are two major pathways to the onset of anxiety in this model. The first is from cumulative risk, to precipitating influences, through to anxiety onset. Precipitating influences include stressful events and traumatic experiences. The second major pathway is directly from cumulative risk to anxiety onset. Through this second pathway, children's anxiety levels are predicted to gradually increase over time until they reach clinically significant levels, without any clear precipitating factors.

Following onset, anxiety may persist due to the presence of maintaining influences. Conversely, anxiety levels may also be reduced by ameliorating influences. Vasey and Dadds (2001) propose that maintaining and ameliorating influences may be the same factors that initially contributed to anxiety onset. Maintaining and ameliorating influences, however, may also change over time.

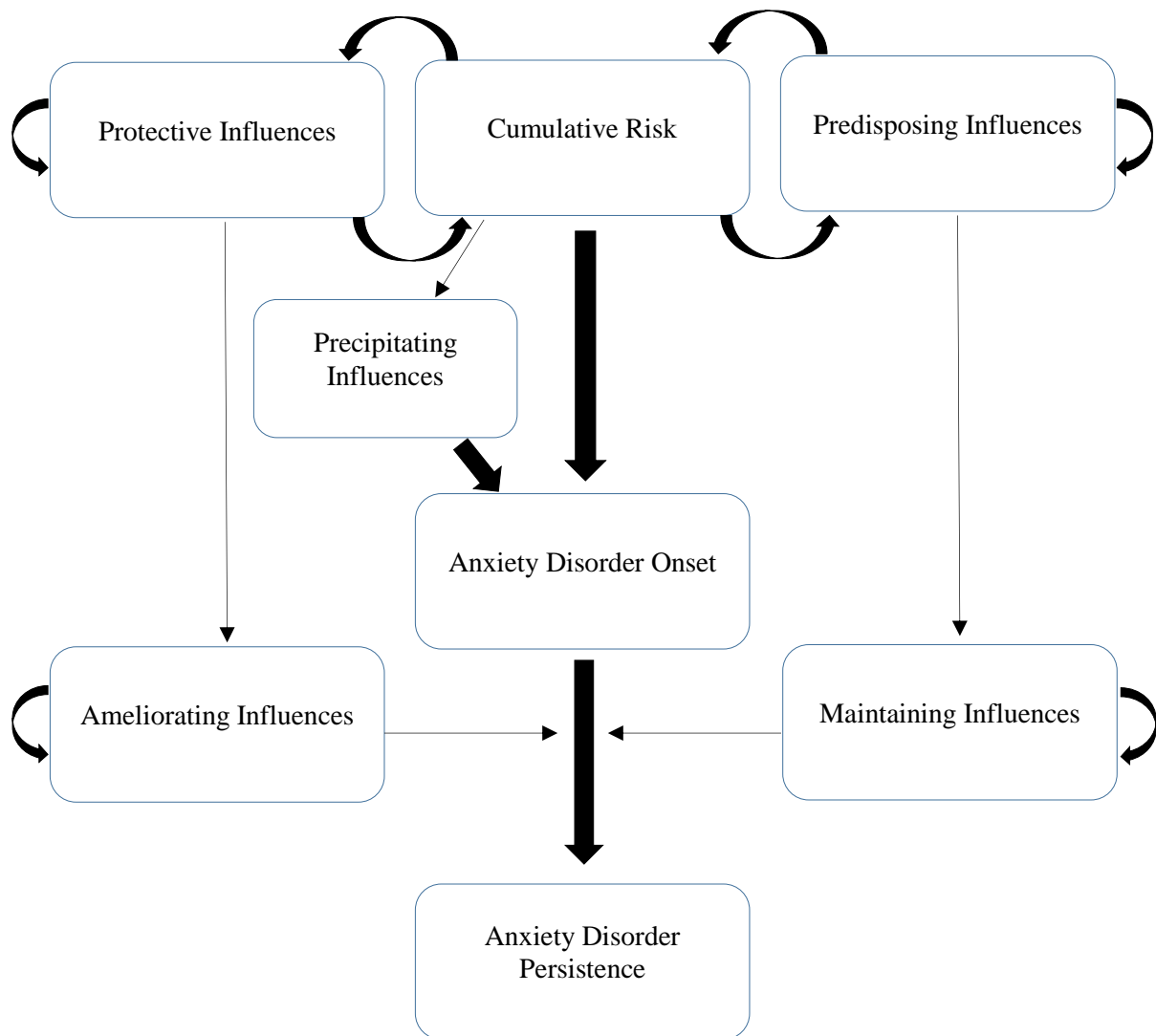


Figure 1.1. Transactional model of factors involved in the development, maintenance, and amelioration of anxiety in childhood. Adapted from *The Developmental Psychopathology of Anxiety* (p. 13), by M. W. Vasey, and M. R. Dadds, 2001, New York, NY: Oxford University Press.

Vasey and Dadds (2001) hypothesise that there are five key areas that influence the maintenance or amelioration of anxiety (Figure 1.2). These five factors are: (1) using cognitive or behavioural avoidance as a means of coping, (2) incompetent social skills and emotion regulation skills, (3) cognitive biases, such as a tendency to interpret ambiguity in a negative manner, (4) punishment and failure experiences, such as rejection from peers, (5) parenting (and others') behaviours, such as overprotection, that reduces exposure and rewards avoidance to anxiety-provoking situations. Each factor can potentially contribute to the maintenance of any other factor via transactional and reciprocal relationships. Moreover, maintaining factors are proposed to interact over time and can lead to an exacerbation of any

other factor. For example, a child may become easily distressed across a range of situations as a result of their cognitive biases and parents may engage in overprotection to prevent distress. With time, overprotective parenting behaviours may increase as parents are reinforced through the reduction of their child's distress. Yet the long-term consequence of parental overprotection may be that their child does not have sufficient exposure to situations where they can learn that the world is not always threatening. In this way, both parental overprotection and cognitive biases may maintain and intensify each other. The five factors shown in Figure 1.2 may similarly be ameliorating influences. For instance, exposure to feared situations rather than avoidance behaviours may reduce cognitive biases as children can learn that previously avoided situations are manageable.

Conclusions and overarching aims of the current thesis. Vasey and Dadds (2001) predict that cumulative risk for anxiety is determined by the presence of predisposing and protective influences that are dynamic and can change over time. Following the development of anxiety, the persistence of clinically significant levels of anxiety is determined by ameliorating and maintaining influences. The interactions between ameliorating and maintaining influences determine whether high levels of anxiety persist. The overarching aim of this thesis was to investigate factors that are predicted to be involved in the aetiology and maintenance of anxiety in young people. In particular, the focus of this thesis is on two such factors: cognitive biases and parenting behaviours.

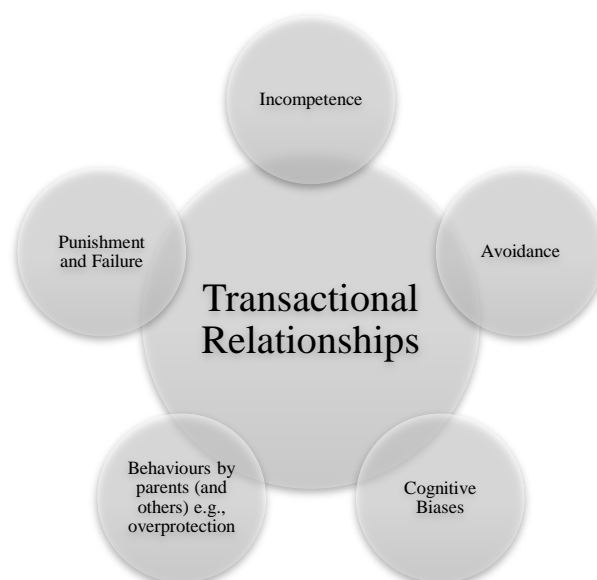


Figure 1.2. Factors proposed to be involved in the maintenance of anxiety in childhood. Adapted from *The Developmental Psychopathology of Anxiety* (p. 19), by M. W. Vasey, and M. R. Dadds, 2001, New York, NY: Oxford University Press.

In Study 1 and Study 2, I investigated cognitive biases associated with anxiety. Specifically, the first two studies focus on the relationships amongst anxiety in children, interpretation bias, and memory bias. As will be outlined in the next section, cognitive biases are purported to be interrelated processes that have reciprocal relationships (Hirsch, Meeten, Krahè, & Reeder, 2016). These reciprocal relationships may be self-perpetuating, and may also function to maintain and create a vulnerability for anxiety in young people.

The focus of Study 3 is then turned to parenting behaviours associated with the development and maintenance of anxiety. Specifically, parental autonomy restriction and autonomy support are investigated within a mother-adolescent conversation about a shared emotional event experienced in the past. Parenting behaviours that serve to restrict rather than support autonomy, have been implicated in the development and perpetuation of cognitive biases. Study 3, therefore, provides a bridge between individual level cognitive mechanisms and the environmental contexts that may contribute to and maintain anxiety in young people.

In the next section, I review research that is relevant for understanding cognitive biases in the context of anxiety. Following this, I review theories that delineate the role of parenting behaviours associated with anxiety in young people.

Cognitive Biases and Anxiety in Young People

Cognitive theories of anxiety predict that anxiety is characterised by cognitive biases in attention, interpretation, and memory (e.g., Beck & Clark, 1997; Muris & Field, 2008; Kendall, 1985; Weems & Watts, 2005). In other words, anxious people have a tendency to attend to negative stimuli, interpret ambiguity in a negative manner, and have an enhanced tendency to recall negative information from memory. In the context of anxiety, negative stimuli are those which are perceived as a threat or a danger to oneself.

Cognitive theories of anxiety in young people propose that overactive schemata, which contain information pertaining to threat and danger, are the driving force behind cognitive biases (Daleiden & Vasey, 1997; Kendall, 1985; Kendall, 2006; Muris & Field, 2008). Schemata are cognitive structures that are formed in response to our experiences and contain a representation of some specific facet of the world. Cognitive biases are proposed to maintain high levels of anxiety by eliciting anxious affect and avoidance behaviours (Hertel, Brozovich, Joormann, & Gotlib, 2008; Mathews & Mackintosh, 2000; Muris & Field, 2008). In a reciprocal relationship, cognitive biases are theorised to also create a vulnerability for anxiety by strengthening schemata that represent the world as a threatening and dangerous place (Mathews & Mackintosh, 2000; Muris & Field, 2008). However, a greater amount of experimental and longitudinal research is needed to understand the role of cognitive biases in

the aetiology and maintenance of anxiety disorders, especially, in young people (Field & Field, 2013; Field, Hadwin, & Lester, 2011; Muris & Field, 2011). Longitudinal and experimental studies on this issue are reviewed in more detail in Chapter 2.

As previously highlighted, the focus in the current thesis is on interpretation bias and memory bias in children. *Interpretation bias* is defined as a tendency to form negative interpretations and/or catastrophise in response to ambiguous cues (Beard, 2011). Ambiguous cues occur throughout our day to day lives and are open to being interpreted in either a benign or a negative manner (Hirsch et al., 2016). A body of research has established that young people with higher levels of anxiety tend to interpret ambiguity in a negative manner (reviewed in Chapter 2). In the context of anxiety disorders, *memory bias* is defined as a tendency to recall past experiences or information in a disproportionately negative manner (Weems & Watts, 2005). The specific focus in this thesis is whether young people with higher levels of anxiety tend to recall ambiguous stimuli a more negative manner than young people with lower levels of anxiety. Compared to the research on interpretation bias, there is a much smaller body of research that has investigated memory bias in relation to anxiety in young people. The research conducted thus far is reviewed in Chapter 2.

There is very little research investigating the relationships *amongst* cognitive biases. Yet anxiety may be maintained through synergistic relationships that exist amongst cognitive biases (Hertel & Brozovich, 2010; Hirsch, Clark, & Mathews, 2006). In particular, interpretation bias may create a memory bias in regard to how ambiguous information is remembered (Hertel & Brozovich, 2010). Research in adults has shown that interpretation biases may lead to negative memories for ambiguous situations (Hertel, Brozovich, Joormann, & Gotlib, 2008; Tran, Hertel, Joormann, & Gotlib, 2011). Negative memories that result from interpretation biases are proposed to subsequently maintain anxiety by encouraging avoidance behaviours, eliciting anxious affect, and perpetuating future negative interpretations (Hertel et al., 2008; Tran et al., 2011). Although there is some cross-sectional research investigating the relationship between interpretation bias and memory bias in children (Field & Field, 2013; Klein et al., 2014), the research on this topic is limited. Moreover, there are no experimental studies investigating whether there is evidence for a causal relationship between interpretation bias and memory bias in children.

A deeper understanding of these cognitive processes is warranted due to the proposed role that cognitive biases play in the development and maintenance of anxiety (Hertel et al., 2008; Muris & Field, 2008). Furthermore, biased cognitive processes may be less entrenched during childhood and therefore providing interventions during this developmental window

may be effective in the prevention of anxiety (Pine, 2007). However, an understanding of the cognitive mechanisms that underlie anxiety during childhood is needed in order to develop effective, targeted interventions.

As only a limited number of studies have investigated the relationships amongst cognitive biases and anxiety in children, and in particular the relationship between interpretation bias and memory bias, the aim of the first two studies in this thesis was to address this gap in the literature.

Study 1 investigated the correlational relationships amongst anxiety, interpretation bias, and memory bias in children. Study 2 employed an experimental paradigm to establish whether the way in which ambiguity is interpreted affects later memory for that information. The research conducted in Study 1 and Study 2 contributes to an understanding of the cognitive mechanisms that may underpin the development and maintenance of anxiety in young people.

Parenting Behaviours and Anxiety in Young People

Parenting behaviours are predicted to be a key factor in the risk and maintenance of anxiety in young people (Burt, 2009; Craske, 1997; Vasey & Dadds, 2001). Of relevance to this thesis are parental autonomy restriction and parental autonomy support. Throughout this thesis the term “autonomy restriction” is used to encompass parenting behaviours variously described as overcontrolling, overprotective, overinvolved, or intrusive. The term “autonomy support” is used to encompass parenting behaviours that have been described in the literature as encouraging, autonomy granting, and challenging parenting behaviours. As mentioned earlier, the term “children” is used in the remainder of this section to discuss theoretical predictions relating to parenting behaviours and anxiety.

A large body of research has demonstrated that higher levels of parental autonomy restriction and lower levels of parental autonomy support are associated with higher levels of anxiety in young people (e.g., McLeod, Wood, & Weisz, 2007). There are also longitudinal findings consistent with the prediction that these parental behaviours play a causal and/or maintaining role in anxiety (e.g., Lewis-Morrarty et al., 2012; Murray et al., 2014).

One of the ways in which parental autonomy restriction is predicted to contribute to anxiety in children is via the development of interpretation biases (Ollendick & Benoit, 2012). This is because parental autonomy restriction may implicitly convey that the world is a dangerous place and that the child is unable to manage potential threats (Affrunti & Ginsburg, 2012; Chorpita & Barlow, 1998; Creswell, Cooper, & Murray, 2010). Yet there is

limited research investigating the relationship between interpretation biases and parental autonomy restriction and support; this is one of two key relationships investigated in Study 3.

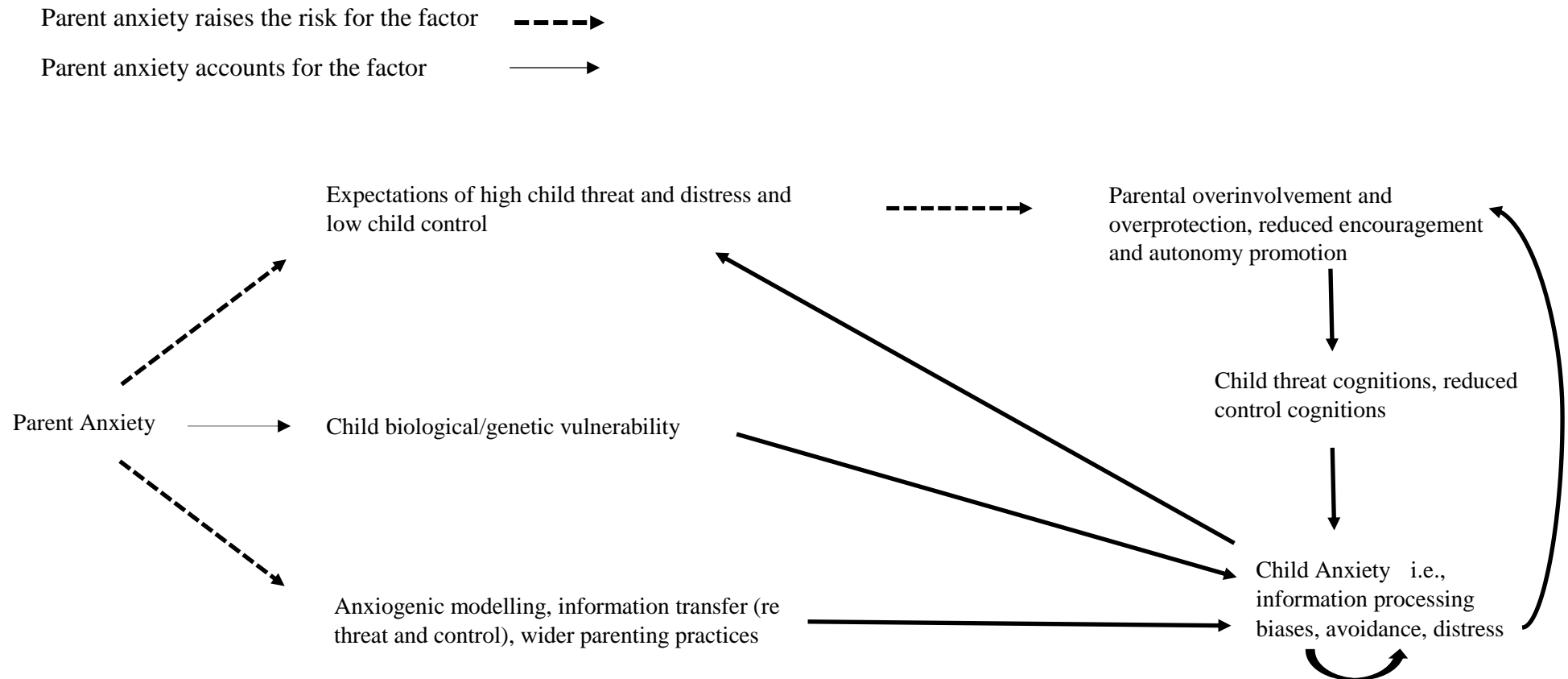
When considering the potential contribution of parenting behaviours to anxiety in children, however, it is also important to consider that certain parenting behaviours are likely to be elicited by characteristics of children (Murray, Creswell, & Cooper, 2009). Several theories propose that children who have interpretation biases or tend to become easily fearful, are more likely to elicit parental autonomy restriction and less likely to elicit autonomy support (Creswell, Murray, & Cooper, 2010; Ollendick & Benoit, 2012; Rapee, 2001). One of the proposed reasons for this is that when children have interpretation biases, their parents are more likely to hold attributions that their child is attuned to potential threats in their environment and will not be able to cope (Creswell, Murray, & Cooper, 2010). These kinds of parental attributions are predicted to lead to higher levels of autonomy restriction in order to prevent their child from becoming distressed (Creswell, Murray, Stacey, & Cooper, 2011). There is also limited research that has investigated this relationship between parental attributions and parental autonomy restriction and support; this is the second key relationship investigated in Study 3.

To aid understanding of the range of pathways relevant for understanding parenting behaviours in the context of anxiety, Figure 1.3 is provided. Figure 1.3 is a cognitive-behavioural model proposed by Creswell and colleagues (Creswell, Murray et al., 2011) that delineates a variety of characteristics of children and their parents that may influence parent-child interactions, and in turn, anxiety in children. Although this model is referred to as a theoretical model for childhood anxiety, the research used to justify the pathways also included adolescents. Below, I outline the major predictions from this model.

Children's anxiety is predicted to be maintained through cognitive biases, avoidance behaviours, and high levels of distress. Moreover, parenting behaviours characterised by higher levels of autonomy restriction and lower levels of autonomy support serve to reinforce children's anxiety by contributing to children's beliefs that the world is dangerous and that they cannot cope with potential threats. The relationship between children's anxiety and parenting behaviours is predicted to be bidirectional in nature. Children who have cognitive biases, exhibit avoidance behaviours, and who become easily distressed, are more likely to elicit parental autonomy restriction and less likely to elicit autonomy support. Parental autonomy restriction may be elicited directly in response to children's characteristics, or indirectly as parents of highly anxious children will be more likely to hold attributions that their child has interpretation biases and will become easily distressed.

Several pathways stemming from parental anxiety are also proposed. Higher levels of parental anxiety may contribute to children's anxiety in the following ways: (1) a child may inherit a genetic vulnerability for anxiety, (2) the parent may convey that the world is threatening or model anxiogenic behaviour, such as avoidance, (3) the parent may be more likely to have attributions that their child has interpretation biases and will become easily distressed. The presence of higher levels of parental anxiety therefore increases the likelihood of parental autonomy restriction and attributions that their child has interpretation biases (as shown by the dashed arrows in Figure 1.3).

The overarching aim of Study 3 was to investigate parental autonomy restriction and support in the context of a parent-adolescent conversation, and their associations with anxiety, parental attributions, and interpretation biases. This theory by Creswell, Murray et al. (2011), along with several other theories which will be reviewed in Chapter 4, were used to guide the research questions for Study 3. As highlighted previously, there is limited research regarding two relationships, which I address in Study 3: (1) the relationship between young people's interpretation biases and parental autonomy restriction and support, (2) the relationship between parental attributions and parental autonomy restriction and support.



*Figure 1.3. Parenting pathways to child anxiety. Adapted from *Anxiety Disorders in Children and Adolescents* (p.316), by Creswell, Murray, Stacey, and Cooper, 2011, Cambridge, UK: Cambridge University Press.*

To investigate the main research questions in Study 3, maternal autonomy restriction and autonomy support were investigated within mother-adolescent conversations about a past emotional experience (a conflict that they had experienced together). Because autonomy development becomes a key developmental task during adolescence, the extent to which parents restrict or encourage autonomy during this developmental period may be crucial to understanding the onset and maintenance of anxiety or whether there is continuity of anxiety through into adulthood (Berk, 2007; Petit, Laird, Dodge, Bates, & Criss, 2001). Conversations about past emotional experiences were chosen as they are a context in which memories are shaped and socioemotional development occurs (Cleveland & Reese, 2007). Moreover, parent-adolescent conversations are proposed to be an important context in which autonomy development occurs during adolescence (Weeks & Pasupathi, 2010).

Overall Conclusions and Major Aims of the Research Conducted in this Thesis

Anxiety is one of the most common forms of psychopathology in young people (Costello et al., 2011). Although fears and worries may be common and follow developmental patterns, the presence of higher levels of anxiety can cause significant distress and impairment (Muris & Field, 2011). A range of factors have been implicated in the development and maintenance of anxiety. Vasey and Dadds (2001) theorise that the developmental pathways that children follow, in regard to risk for anxiety, are dynamic and dependent on interactions between a multitude of predisposing and protective factors. Following the development of anxiety, high levels of anxiety may persist due to the presence of maintaining influences that have transactional relationships over time. Maintaining factors for anxiety also occur at both an individual level and at an environmental level. Within this thesis the focus is on cognitive biases, which occur at an individual level, and parenting behaviours, which occur at an environmental level.

Cognitive biases. Research has shown that young people with higher levels of anxiety have interpretation biases, which is defined as a tendency to interpret ambiguous cues in a negative manner (Beard, 2011). A small number of studies have also shown that young people with higher levels of anxiety have memory biases, and show a tendency to recall information in a disproportionately negative manner (e.g., Watts & Weems, 2006). Despite research being conducted regarding the basic relationships between anxiety and cognitive biases, a limited number of studies have investigated the relationships *amongst* cognitive biases associated with anxiety in young people. Yet in adults there is evidence that interpretation biases cause negative memories for ambiguous situations (Hertel & Brozovich, 2010; Tran et al., 2011). Very few studies have investigated this relationship in children, and

there is no experimental research in children that investigates whether there is evidence that negative interpretations influence memory for ambiguous information. The first two studies addressed these gaps in the literature by investigating the relationship between interpretation bias, memory bias, and their associations with anxiety in children. The main research questions for Study 1 and Study 2 were as follows:

- 1) In Study 1, the main research question was whether there was a cross-sectional relationship between interpretation bias and memory bias in children. Additionally, the cross-sectional relationships between these cognitive biases and anxiety were also investigated.
- 2) Study 2 investigated whether there was evidence that interpretations for ambiguous information influence children's memory. Specifically, I investigated whether negative interpretations for ambiguous information subsequently resulted in negative memories for that ambiguous information. In addition, the association between anxiety and memory bias in children was also investigated.

Parenting behaviours. Parenting behaviours are also predicted to contribute to the development and maintenance of anxiety in children (Vasey & Dadds, 2001). Greater amounts of parental autonomy restriction may signal to children that the world is a dangerous place while simultaneously reducing exposure to feared situations (Affrunti & Ginsburg, 2012). In this way, parental autonomy restriction may exacerbate interpretation biases and, in turn, anxiety in children (Creswell, Cooper, & Murray, 2010; Ollendick & Benoit, 2012). Children who have interpretation biases, however, may also elicit a greater amount of parental autonomy restriction and lower levels of autonomy support (Creswell, Cooper, & Murray, 2010; Creswell, Murray et al., 2011). These behaviours may be elicited directly, or via parental attributions. In particular, parents who hold attributions that their child has an interpretation bias are proposed to be more likely to restrict autonomy and less likely to support autonomy (Creswell, Cooper, & Murray, 2010; Ollendick & Benoit, 2012).

Limited research has investigated the relationship between interpretation biases in young people and parental autonomy restriction and support. Moreover, no research has investigated the relationship between parental attributions and parental autonomy restriction and support. These gaps in the literature were addressed in Study 3, within the context of the following overarching aim:

- 3) The overarching aim of Study 3 was to investigate parental autonomy restriction and support within mother-adolescent conversations, and their associations with anxiety, parental attributions, and adolescents' interpretation biases. This was achieved by asking mother-adolescent dyads to have a conversation about a recent conflict they had experienced together. Maternal and adolescent anxiety levels were assessed, in addition to maternal attributions and adolescent interpretation biases.

Chapter 2: Cognitive Biases and Anxiety in Young People

The focus of this chapter is on two kinds of cognitive biases that occur in anxiety; interpretation bias and memory bias. Interpretation bias is defined as a tendency to form negative or catastrophic interpretations in response to ambiguous or mildly negative cues (Beard, 2011). Memory bias is defined as a tendency to recall past experiences and information in a manner that is disproportionately negative and threatening (Weems & Watts, 2005).

Interpretation bias is proposed to create a memory bias as it can lead to ambiguous experiences and information being recalled in a negative manner (Hertel & Brozovich, 2010). Moreover, this relationship between interpretation bias and memory may be involved in the development and maintenance of anxiety (Mathews & Mackintosh, 2000; Hertel et al., 2008). Very little research, however, has investigated relationships amongst interpretation bias, memory bias, and anxiety in children. Study 1 addresses this gap in the literature by investigating the cross-sectional associations amongst these particular cognitive biases and anxiety in children. Study 2 extends Study 1 by investigating the relationship between interpretation bias and memory bias in children, within an experimental paradigm. First, I review research investigating the relationship between anxiety and interpretation biases in young people. Next, I review the comparatively smaller body of research investigating the relationship between anxiety and memory biases in young people. I finish with a review of the limited number of studies that have investigated the relationships amongst anxiety, interpretation bias, and memory bias in young people.

The Relationship between Anxiety and Interpretation Bias in Young People

Young people are confronted with ambiguity throughout their daily lives, and how young people interpret these kinds of situations is critical to their understanding of what is happening and for making sense of others' behaviour (Hirsch et al., 2016). Ambiguous situations are open to being interpreted in both a negative or a benign manner. For instance, upon seeing a group of peers laughing in the playground, a young person with higher levels of anxiety may think that they are being laughed at whereas a young person with lower levels of anxiety may think that their peers are simply having fun (Barrett, Rapee, Dadds, & Ryan, 1996).

A large body of research has shown that young people with higher levels of anxiety tend to interpret ambiguity in a negative manner (Hadwin, Gardner, & Perez-Olivas, 2006; Lau et al., 2012). Indeed, a recent meta-analysis has demonstrated that the overall effect size between anxiety and interpretation bias in young people is moderate in size (Stuijzand,

Creswell, Field, Pearcey, & Dodd, 2017). Stuijzfand et al. (2017) did not find that this effect was moderated by the sample population recruited (i.e., community or clinical sample), subtype of anxiety under consideration, or gender. However, the effect size was moderated by age, indicating that the effect size became larger with increasing age.

In the following section I provide an overview of some of the research findings in this area. A summary of the studies which I review in more detail are provided in Table 2.1. Although the participants in Study 1 were children in middle to late childhood ($M = 10.1$ years, $SD = 0.8$), I review research than has recruited younger children and adolescents. For clarity, and because study samples vary in age range, I use the term “children” to refer to participant samples under the age of 13 years and I use the term “young people” to refer to participant samples that include both children and adolescents. First, I review some of the key findings from cross-sectional research, followed by a review of findings from longitudinal studies.

Table 2.1

Summary of Studies that have Investigated the Relationship between Anxiety and Interpretation Bias in Young People

Author/s	Age & Sample Size	Questionnaire	Paradigm/Stimuli	Participants	Results
Barrett et al., (1996)	7-14 $N = 205$	ADIS-C ADIS- P	Ambiguous vignettes of social and physical threats	HA group recruited from clinics	HA group more likely to choose avoidant plans than both LA and EX. HA group more likely to choose threat interpretations than LA, but less likely to choose threat interpretations than EX
Bell-Dolan (1995)	9-11 $N = 90$	RCMAS	Videotaped vignettes of ambiguous, hostile, and non-hostile social interactions	Community, selected based on being HA or LA	HA more likely to label non-hostile interactions as hostile than LA. Girls labelled ambiguous interactions as hostile more often than boys.
Bögels, Snieder, & Kindt (2003)	7-12 $N = 96$	SCARED	Ambiguous vignettes of general, social, and separation threats	Some HA recruited from clinics and some community, control group from community	HA reported they would feel greater levels of negative affect in the situations than LA
Bögels & Zigterman (2000)	9-18 $N = 45$	DISC	Ambiguous vignettes of general, separation, and social threats	HA group recruited from clinics, control recruited from community	HA more likely to underestimate coping ability but were not more likely to choose negative interpretations than LA
Chorpita, Albano, & Barlow (1996)	9-13 $N = 12$	STAIC	Ambiguous vignettes of social, physical, separation, and general threats	HA group recruited form clinics, control group recruited from community	Anxiety positively correlated with negative interpretations and anxious/avoidant plans.

Creswell & O'Connor (2010)	10-11 <i>N</i> = 65	SCAS	Ambiguous vignettes of social and physical threats	Community	Children's anticipated distress longitudinally predicted higher anxiety at 1-year follow-up
Creswell, Shildrick, & Field (2011)	5-9 years <i>N</i> = 110	ARBQ (adapted) CBCL (adapted)	Ambiguous vignettes of social and physical threats	Community	Children's anticipated distress longitudinally predicted anxiety at 3-year follow-up
Dodd, Hudson, Morris, & Wise (2012)	3-4 years at baseline <i>N</i> = 131	ADIS-P PAS SCAS	Ambiguous story stems representing physical threat, social threat, and separation threat	Recruited from a larger pool of community sample based on being high or low on behavioural inhibition	Children who made a greater number of negative interpretations had stable anxiety levels at a 1-year follow-up, children who made fewer negative interpretations showed decreased anxiety levels
Dodd, Stuijzand, Morris, & Hudson (2015)	11-12 <i>N</i> = 103	ADIS-C ADIS-P SCAS	Ambiguous vignettes of social and non-social situations	Recruited from a larger pool of community sample based on being high or low on behavioural inhibition	Anxiety correlated with generation of greater numbers of negative interpretations and greater levels of anticipated negative affect. Some differences in effect size across anxiety measures
Eley et al. (2008)	8-9 <i>N</i> = 300	ARBQ SCARED	Homophones and ambiguous vignettes	Community	Anxiety significantly correlated with negative interpretations for ambiguous vignettes, but not when controlling for depression
Hadwin, Frost, French, & Richards (1997)	7-9 <i>N</i> = 40	RCMAS	Homophones (e.g., die/dye)	Community	HA more likely to choose threatening interpretation of homophone than LA
Higa & Daleiden (2008)	Mean age 11.5 <i>N</i> = 175	SPAI-C	Ambiguous vignettes of social situations	Community	HA gave a greater number of anxious interpretations than LA. Girls gave a greater number of anxious interpretations than boys
In-Albon, Dubi, Rapee, & Schneider (2009)	5-13 <i>N</i> = 144	ADIS-C ADIS-P RCMAS	Ambiguous, benign, and threatening pictures for separation situations and social situations	Clinical and community	Children with higher levels of separation anxiety rated ambiguous separation pictures as more unpleasant. HA did not differ from LA in negative interpretations of the ambiguous pictures.
Miers, Blöte, Bögels, & Westenberg (2008)	12-16 <i>N</i> = 73	SAS-A	Ambiguous vignettes of social situations	Community	HA gave greater number of negative interpretations than LA. Girls gave a greater number of negative interpretations than boys
Muris, Rapee, Meesters, Schouten, & Geers (2003)	8-13 <i>N</i> = 299	RCMAS SCAS STAIC	Ambiguous vignettes of social situations	Community	Anxiety significantly positively correlated with greater number of threat interpretations and lower threshold for saying the stories would be threatening. Girls also gave a greater number of threat

					interpretations than boys. Variation in effect sizes depending on questionnaire
Muris, Kindt, Bögels, Merckelbach, Gadet, & Moulaert (2000)	8-13 <i>N</i> = 105	DISC SCARED STAIC	Ambiguous vignettes of general, social, and separation threats	Community	Anxiety positively correlated with threat interpretations and anticipated negative affect. Some differences in effect sizes across anxiety questionnaires
Muris, Luermans, Merckelbach, & Mayer (2000)	8-13 <i>N</i> = 76	SASC-R STAIC	Ambiguous vignettes of social threats	Community	SASC-R positively correlated with threat interpretations and negative affect. When controlling for SASC-R, STAIC not significantly correlated with negative interpretations or negative affect
Muris, Meesters, Smulders, & Mayer (2005)	8-12 <i>N</i> = 157	Dominic	Ambiguous vignettes of social, physical, and separation themes	Community	Anxiety positively correlated with threat interpretations and lower threshold for rating stories as scary
Muris, Merckelbach, & Damsma (2000)	8-13 <i>N</i> = 252	SASC SCAS DISC	Ambiguous vignettes of general, social, and separation threats	Community	HA children lower threshold for rating stories as scary, greater number negative interpretations, & reported they would feel greater levels of negative emotion than LA
Pass, Arteché, Cooper, Creswell, & Murray (2012)	4.5 at baseline <i>N</i> = 190	CBCL TRF	Doll play narratives for social and separation situations	Mothers with social anxiety diagnosis recruited from clinic	Children who gave a greater number of negative interpretations and endorsed avoidance had higher internalising symptoms approximately five months later
Taghavi Moradi, Neshat-Doost, Yule, & Dalgleish (2000)	8-17 <i>N</i> = 57	RCMAS	Homographs (e.g., hang)	HA group recruited from clinics, control group recruited from community	HA more likely to choose threatening homographs than LA
Vassilopoulos & Banerjee (2008)	11-13 <i>N</i> = 145	SASC-R	Slightly negative vignettes of social situations	Community	Anxiety positively correlated with catastrophic interpretations and greater expectation of negative affect
Warren, Emde, & Sroufe (2000)	5 years at baseline <i>N</i> = 35	CBCL DISC STAIC TRF	Ambiguous and slightly negative story stems	Community	Children's negative expectations longitudinally predicted higher levels of anxiety at 1-year follow-up
Waters, Craske, Bergman, & Treanor, (2008)	7-12 <i>N</i> = 45	ADIS MASC	Ambiguous vignettes of general, social, and separation threats	HA group recruited from clinics, control recruited from community	HA reported they would feel greater levels of negative affect and would be less able to influence the situations than LA
Waters, Wharton, Zimmer-	8-12 <i>N</i> = 36	ADIS-C ADIS-P SCAS	Homographs and ambiguous vignettes	HA group recruited from clinic, control	No differences between HA and LA for homographs. Anxiety positively correlated

Gembeck, & Craske (2008)	group recruited from community	with negative affect and expectation of danger
-----------------------------	-----------------------------------	---

Note. HA = High Anxiety. LA = Low Anxiety. EX = Externalising problems. ADIS-C = Anxiety Disorders Interview Schedule for Children (Silverman & Nelles, 1988); ADIS-P = Anxiety Disorders Interview Schedule for Parents (Silverman & Nelles, 1988; ARBQ = Anxiety Related Behaviours Questionnaire (Eley, Bolton, O'Connor, Perrin, Smith, & Plomin, 2003); CASI = Children's Anxiety Sensitivity Inventory (Silverman, Fleisig, Rabian, & Peterson, 1991); CBCL = Child Behaviour Checklist (Achenbach & Edelbrock 1991); DISC = Diagnostic Interview Schedule for Children (Shaffer et al., 1996); Dominic (Valla, Bergeron, & Smolla, 2000); PAS = Preschool Anxiety Scale (Spence, Rapee, McDonald, & Ingram, 2001); RCMAS = Revised Children's Manifest Anxiety Scale (Reynolds & Richmond, 1978; 2008); SADS-C = Spider Anxiety and Disgust Screening for Children (Klein, van Niekerk, Baartmans, Rinck, & Becker, 2012); SAS-A = Social Anxiety Scale for Adolescents (La Greca & Lopez, 1998); SCAS = Spence Children's Anxiety Scale (Spence, 1998); SPAI-C = Social Phobia Anxiety Inventory for Children (Beidel, Turner, & Morris, 1995); STAIC = State-Trait Anxiety Inventory for Children (Spielberger, 1973); TRF = Teacher Report Form (Achenbach & Rescorla, 2000).

Cross-sectional research investigating anxiety and interpretation biases in young people. Interpretation biases are assessed by presenting participants with ambiguous stimuli that they are asked to disambiguate in some way. While most studies investigating the relationship between anxiety and interpretation bias have used ambiguous vignettes, a small number of studies have employed other kinds of ambiguous stimuli, namely homophones and homographs (Hadwin et al., 1997; Taghavi, et al, 2000; Waters, Wharton et al., 2008). Homophones are words that sound the same, but have more than one meaning (e.g., die and dye) and homographs are words that look the same but can have more than one meaning (e.g., hang). Young people with higher levels of anxiety tend to interpret these stimuli in a negative manner, for example, by constructing sentences using the threatening meaning for homographs that can have either a threatening or benign meaning (Taghavi et al., 2000).

Ambiguous vignettes are the most frequently used method to assess interpretation biases (Castillo & Leandro, 2010). The ambiguous vignettes paradigm involves presenting participants with vignettes that describe ambiguous situations, and then asking participants to disambiguate each situation. As shown in Table 2.1, many researchers employ a range of vignettes that depict possible social, physical, or general threats. For example, Barrett et al. (1996) presented young people with vignettes depicting potential social threats, such as: “You see a group of students from another class playing a great game, as you walk over and want to join in, you notice that they are laughing” (p. 192).

There is some variation across studies regarding what kinds of responses young people are asked to give in order to disambiguate the vignettes. Disambiguation may involve young people providing their own interpretation for what they think is happening, saying what they think will happen next in the story, or they may be requested to choose from a selection of negative or benign interpretations. Young people may also be asked to provide behavioural plans by saying what they would do in each situation, and they may also be asked about what kinds of emotions they would have or how distressed they would feel.

A range of studies have demonstrated that young people with higher levels of anxiety, relative to lower levels, are more likely to provide negative interpretations in response to ambiguous vignettes (Barrett et al., 1996; Bögels & Zigterman, 2000; Chorpita et al., 1996; Vassilopoulos & Banerjee, 2008; Waters, Wharton et al., 2008). Several studies, by Muris and colleagues, have also demonstrated that young people with higher levels of anxiety tend to have a lower threshold for detecting threat (Muris, Merckelbach, & Damsma, 2000; Muris et al., 2005; Muris et al., 2003). This variation of interpretation bias is known as a reduced evidence for danger (RED). To assess RED, young people are presented with an ambiguous story, sentence by sentence. After each sentence, young people are asked to say if they think the story will have a scary ending. Young people who have higher levels of anxiety tend to report that the story will have a scary ending after fewer sentences.

Anticipated behavioural plans also differ between young people with higher relative to lower levels of anxiety. When asked what they would do in response to ambiguous vignettes, young people with higher levels of anxiety are more likely to give avoidant behavioural plans (Chorpita et al., 1996). There is also evidence that avoidant behavioural plans in response to ambiguity are characteristic of anxiety, whereas young people with other kinds of psychopathology will also endorse negative interpretations. For instance, Barrett et al. (1996) recruited young people who met diagnostic criteria for an anxiety disorder, young people who met diagnostic criteria for oppositional defiant disorder, and a control group without anxiety or oppositional problems. The young people were presented with ambiguous vignettes and were asked what they thought would happen next and what they would do in each situation. The young people with anxiety disorders provided a greater number of negative interpretations for the ambiguous vignettes in comparison to the control group. Yet the young people with oppositional problems provided a greater number of negative interpretations than both the anxious group and the control group. When asked what they would do, however, the anxious group were more likely to give avoidant behavioural plans than both the control group and the oppositional group. What these results suggest is that negative interpretations in response to ambiguity may be a common feature of both anxiety and oppositional problems in young people. Yet when faced with ambiguity, young people with higher levels of anxiety may be more likely to avoid these situations whereas oppositional children will become aggressive. Avoidance behaviours are proposed to maintain anxiety disorders by preventing young people from developing a sense of self-efficacy and from learning that they can manage potential challenges (Dadds, Barrett, Rapee, & Ryan, 1996).

Young people with higher levels of anxiety also report lower self-efficacy beliefs regarding their ability to cope with ambiguous situations, and express that they will be less able to have an influence in response to these kinds of scenarios (Bögels & Zigterman, 2000; Waters, Craske et al., 2008). Moreover, several studies have requested young people to report the extent to which they would feel a range of negative emotions if they were to experience situations depicted in the ambiguous vignettes, such as being worried, scared, and shy (Bögels et al., 2003; Waters, Craske et al., 2008; Waters, Wharton et al., 2008). Asking young people to predict their level of negative affect is also known as “anticipated distress”. Young people with higher levels of anxiety tend to report higher levels of anticipated distress than young people with lower levels of anxiety. Additionally, the association between anxiety and anticipated distress has been found to be stronger than the association between anxiety and negative interpretations (e.g., asking a young person what they think will happen next) in several studies (e.g., Creswell & O’Connor, 2010; Waters, Craske et al., 2008). These kinds of responses suggest that young people with higher levels of anxiety have difficulties with emotion-regulation, and have not developed coping skills that assist them to manage their emotions (Suveg & Zeman, 2010; Vasey & Dadds, 2001).

Several studies have also found gender differences in interpretation biases. Girls have been found to give a greater number of negative and threat-themed interpretations than boys for ambiguous vignettes depicting social situations (Higa & Daleiden, 2008; Miers et al., 2008). Girls have also been shown to have a lower threshold than boys for deciding that ambiguous vignettes, depicting social situations, were threatening (Muris et al., 2003). Despite these gender differences found in individual studies, the meta-analysis by Stuijzand et al. (2017) showed that gender was not a significant moderator of the association between anxiety and interpretation bias.

What is also noticeable from Table 2.1 is that there is variation in the questionnaires that have been used to assess anxiety. Questionnaires to assess anxiety in young people differ in the extent to which they capture symptom clusters of anxiety subtypes (e.g., separation anxiety, social anxiety) versus general levels of anxiety (Muris, Merckelbach, Ollendick, King, & Bogie, 2002). Questionnaires also differ regarding whether they are ‘age-downward’ versions of adult questionnaires compared to being developed specifically for young people. For instance, the STAIC (Spielberger, 1973) was developed from its adult counterpart and has been critiqued for presuming that anxiety in children resembles anxiety in adults, despite there being developmental trends in anxiety symptoms (Spence, 1998). Some assessments of anxiety may also tap into general negative affect rather than being ‘pure’ assessments of

anxiety. The State-Trait Anxiety Inventory (STAI; Spielberger, 1985) and its counterpart for children, purportedly measure negative affect rather than ‘pure’ anxiety (Reiss, Silverman, & Weems, 2001), and the Child Behaviour Checklist internalising subscale (CBCL; Achenbach & Edelbrock, 1991) may fail to differentiate between anxiety and other internalising problems in young people (Seligman, Ollendick, Langley, & Baldacci, 2004). While some studies have found differences in the effect size between anxiety and interpretation biases across different anxiety questionnaires (e.g., Dodd et al., 2015; Muris et al., 2003; Muris, Kindt et al., 2000) the variation across studies makes it difficult to draw conclusions regarding whether the anxiety questionnaire/s employed influences findings.

In conclusion, ambiguous vignettes are the most frequently used method to assess interpretation biases. A body of literature has demonstrated that young people with higher levels of anxiety tend to interpret ambiguous situations in a negative manner by reporting a greater number of negative interpretations, giving a greater number of avoidant behavioural plans, and reporting that they will experience greater levels of negative affect. Now, I review the longitudinal and experimental research that has been conducted regarding anxiety and interpretation biases in young people. This kind of research can produce a clearer picture regarding directional and causal effects.

Longitudinal and experimental research on the relationship between anxiety and interpretation biases in young people. There is evidence that interpretation biases are present during early childhood. Moreover, higher levels of interpretation biases in preschool children have been shown to longitudinally predict higher levels of anxiety symptoms, even when controlling for baseline anxiety levels (Pass et al., 2012; Warren et al., 2000).

Evidence that interpretation biases maintain anxiety in young children has also been found (Dodd et al., 2012). Specifically, young children who made a greater number of negative interpretations for ambiguous scenarios at baseline had stable anxiety levels at a 1-year follow-up, whereas children who made fewer negative interpretations showed a decline in their anxiety levels. Yet, Dodd et al. (2012) did not find that interpretation biases predicted anxiety at a 2-year or 5-year follow-up. It is possible that interpretation biases may only predict continuity or exacerbation of anxiety over longer periods depending upon the presence of other factors. Indeed, Vasey and Dadds (2001) predict that children’s cumulative risk for anxiety is determined by the balance of risk and protective factors, which interact and change over time.

Significant longitudinal associations between anxiety and interpretation biases have also been found in school-age children. Specifically, children (ages 10-11 years) who

reported that they would feel higher levels of distress in response to ambiguous vignettes, also had higher levels of anxiety at a 1-year follow-up (Creswell & O'Connor, 2010). Children's (ages 5-9 years) anticipated distress has also been shown to longitudinally predict an increase in anxiety at a 3-year follow-up (Creswell, Shildrick, & Field, 2011).

Experimental research supports the prediction that interpretation biases may maintain anxiety in children. *Cognitive Bias Modification of Interpretations* (CBM-I) is a technique whereby participants are trained to endorse either benign or negative interpretations for ambiguity. The typical CBM-I paradigm involves participants being exposed to ambiguous vignettes and they are reinforced for interpreting each vignette in the desired way; either with a benign interpretation or a negative interpretation. CBM-I has been used to investigate the effect of interpretation bias on anxiety levels. Research in adult samples has suggested that training a benign bias may reduce symptoms of anxiety (Hallion & Ruscio, 2011; Mobini, Reynolds, & Mackintosh, 2013), although the research on this topic has been criticised for publication bias and demand characteristics (Cristea, Kok, & Cuijpers, 2015). Nevertheless, training children to interpret ambiguous vignettes in a benign, rather than in a negative manner, has been shown to reduce anxiety symptoms over short-term follow-up periods of less than 1-week (Lau, 2013; Lau, Pettit, & Creswell, 2013; Vassilopoulos, Banerjee, & Prantzalou, 2009).

Overall, experimental and longitudinal research provides evidence that is consistent with the proposal that interpretation biases are involved in the development and maintenance of anxiety in young people. More longitudinal and experimental studies are needed to bolster the current literature.

Although there is a large body of research establishing a relationship between anxiety and interpretation biases in young people, there is far less research regarding the relationship between memory biases and anxiety. Notwithstanding a lack of research, in the next section I will review the literature investigating the relationship between anxiety and memory bias.

The Relationship between Anxiety and Memory Bias

In the context of anxiety disorders, memory bias is defined as a tendency to recall past experiences and information in a manner that is disproportionately negative and of a threatening nature (Weems & Watts, 2005). This disproportionate recall of negative stimuli may be in relation to benign stimuli or in comparison to individuals with lower levels of anxiety (Coles & Heimberg, 2002).

The investigation of memory bias is important due to the critical role of memory in our everyday functioning. A major function of memory for personally experienced past events is

to construct and simulate possible future events. Memory allows us to anticipate events and to enact appropriate behaviours across situations (Klein, 2013). While the recall of negative events may assist us to avoid aversive or dangerous situations, the preferential recall of negative memories across many situations may maintain anxiety by eliciting negative interpretations when in reality the situation is benign. In other words, memory bias may influence an individual's judgments regarding the likelihood of negative or threatening events happening in the future (Tran et al., 2011). Despite evidence that memory bias is involved in emotion regulation processes and the maintenance of mood disorders, very few studies have been conducted to investigate the possible role of memory bias in anxiety disorders (Matt, Vázquez, & Campbell, 1992; Salmon & O'Kearney, 2014).

In this thesis, memory bias is investigated with respect to the valence of memories for ambiguous information. As covered earlier in this review, interpretation biases may create negative memories for ambiguous information and experiences (Hertel & Brozovich, 2010). Moreover, negative memories formed from ambiguous experiences are theorised to create a vulnerability for the development of anxiety (Mathews & Mackintosh, 2000), and are also predicted to be involved in the maintenance of anxiety (Hertel et al., 2008). Because we come across ambiguous cues on a regular basis (Hirsch et al., 2016; Mathews & Mackintosh, 2000), understanding this relationship between interpretation bias and memory may provide insight into how the interpretation of daily experiences maintains or exacerbates anxiety.

Due to a lack of research with young people, in the next section I will begin with a brief review of findings from the adult literature on the relationship between anxiety and memory bias. This will be followed by a review of the small number of studies that have investigated the relationship between anxiety and memory bias in young people.

Relationship between anxiety and memory bias in adults. Mitte (2008) conducted a meta-analysis of studies on the relationship between anxiety and memory bias in adults. Only studies requiring retrieval of stimuli that were of a clearly threatening nature were included, and therefore, the relationship between anxiety and memory bias for ambiguous information was not investigated. One-hundred and six studies were included in the analyses and the results were grouped by whether they used implicit or explicit methods of assessing memory bias. Explicit memory tasks were those that involved recall or recognition of stimuli that had been previously encountered and that participants were directly asked to retrieve from memory. These tasks are proposed to tap into depth of processing, with superior performance for explicit memory tasks hypothesised to reflect a greater level of conceptual processing and processing of meaning (Mitte, 2008). This conceptual processing, however, is

not necessarily a conscious process (Daleiden, 1998). In contrast, implicit memory tasks were those that involved memory for stimuli in an indirect manner, such as the completion of word stems after reading a word list, without instruction to retrieve specific memories (Coles & Heimberg, 2002). Mitte (2008) suggested that performance on implicit tests of memory are influenced by processing the perceptual aspects of stimuli, such as the shape of words.

Evidence was found for a memory bias in adults with higher levels of anxiety, but only for explicit recall of stimuli. Adults with higher levels of anxiety had superior recall for negative stimuli relative to adults with lower levels of anxiety. The effect sizes, however, were small. Additionally, because ambiguous stimuli were excluded from this meta-analysis, we cannot know from this study whether adults with higher levels of anxiety tend to recall ambiguous stimuli differently.

Another meta-analysis has recently been conducted by Herrera and colleagues (Herrera, Monotorio, Cabrera, & Botella, 2017) with similar findings to Mitte (2008). A total of 199 studies were investigated and studies that used ambiguous stimuli were again excluded. Adults with higher levels of anxiety, compared to lower levels of anxiety, show superior recall of negative stimuli but there was no evidence for an implicit memory bias.

In summary, meta-analyses show that adults with higher levels of anxiety show a memory bias for negatively valenced stimuli. Yet studies using ambiguous stimuli were excluded from these meta-analyses despite ambiguous cues being common throughout our daily lives (Hirsch et al., 2016). In the next section, I will review the relatively smaller body of research that has investigated the relationship between anxiety and memory biases in young people.

The relationship between anxiety and memory biases in young people. Only a very small number of studies have investigated the relationship between anxiety and memory biases in young people. Further, most of this research has investigated young people's memory for negatively valenced stimuli. Two studies, however, have investigated young people's memory for ambiguous stimuli and have looked at the relationships amongst anxiety, interpretation bias, and memory bias.

In regard to negatively valenced stimuli, young people with higher levels of anxiety show a memory bias for negative words. For instance, Watts and Weems (2006) found that anxiety in young people (ages 9-17 years) was positively correlated with memory bias. Memory bias was operationalised as the number of threat words relative to neutral words correctly recalled from a previously seen list. Results suggesting that memory bias may be transdiagnostic have also been found (Reid, Salmon, & Lovibond, 2006). Young people (ages

8-14 years) with higher levels of aggression, depression, and anxiety demonstrated a tendency to accurately recall a greater number of negative words relative to positive words. In contrast to these two studies, young people (ages 7-18 years) who met diagnostic criteria for Generalised Anxiety Disorder (GAD) or Post-Traumatic Stress Disorder (PTSD) did not show a memory bias for negative words compared to non-anxious young people (Dalgleish et al., 2003). A limitation of this latter study is that young people with PTSD may have impairments in their verbal memory, and combining the GAD group with the PTSD group for analyses may have confounded the results (Johnsen & Asbjørnsen, 2012).

There is also evidence that memory biases in young people with higher levels of anxiety may arise due to a greater amount of conceptual processing of negative stimuli (Daleiden, 1998). Young people (ages 11-14 years) were assigned to a *perceptual* recall condition or a *conceptual* recall condition to assess their memory of positive, neutral, and negative words. In the *perceptual* condition, participants completed word fragments or were shown words that looked similar to the previously seen words. For example, the word 'dated' was presented as a clue for 'hated'. In the *conceptual* condition, participants were given synonyms or definitions for the target words as clues. Young people with higher levels of anxiety recalled a greater number of negative relative to neutral words, but only in the conceptual recall condition. Daleiden (1998) suggested that this finding reflects a tendency for young people with higher levels of anxiety to automatically engage in greater levels of conceptual processing of negative stimuli. Mitte (2008) and Herrera et al. (2017) also suggested that adults with higher levels of anxiety automatically engage in a greater depth of processing for negative stimuli, based on results from their meta-analyses.

In summary, a small number of studies have investigated the relationship between anxiety in young people and memory bias for negative stimuli. Young people with higher levels of anxiety seem to have superior recall for negative stimuli relative to benign stimuli. A limitation of these studies is a lack of ecological validity. The recall of word lists does not necessarily tell us how events and more complex information are recalled. Moreover, none of this research has investigated how people with higher levels of anxiety recall ambiguous stimuli despite the ubiquitous nature of ambiguity in daily life. Moreover, interpretation biases are predicted to be responsible for causing memory biases for ambiguity in people with higher levels of anxiety (Hertel & Brozovich, 2010). Next, I review research that has used ambiguous stimuli to investigate the relationship between anxiety, interpretation bias, and memory bias in young people.

Research investigating the relationship between interpretation bias and memory bias for ambiguous stimuli in young people. Ambiguous situations occur throughout our daily lives and negative or benign interpretations may be made in response to such situations (Hirsch et al., 2016). Hertel and Brozovich (2010) propose that memory biases in anxiety disorders arise from everyday experiences, particularly those that involve ambiguity, as individuals with higher levels of anxiety are more likely to make negative interpretations which then become part of their stored memory for those events.

Relationships amongst anxiety regarding spiders, interpretation bias, and memory bias were investigated in young people (ages 7-13 years) (Klein et al., 2014). Young people reported their degree of spider anxiety and were then presented with ambiguous vignettes that they were asked to interpret by providing their own ending for each situation. Some of the ambiguous vignettes were designed to suggest the possible presence of a spider, for example: “The television has to be repaired. You will have to crawl under the cabinet. It is very dark. You feel something itching on your arm” (p. 185). Initial analyses indicated that children with higher levels of spider anxiety were more likely to show an interpretation bias in response to the spider-themed vignettes. An example of a negative interpretation was: “Oh no, I see a huge hairy spider that wants to bite me” (p. 195). Immediately after hearing and interpreting all the vignettes, young people were asked to recall the vignettes and the interpretations they had given. Memories of the vignettes were analysed for whether they had negative errors. An example of a negative error in recall for the aforementioned vignette was: “I have to crawl under the television cabinet. Then all of a sudden I see a huge hairy spider that wants to bite me” (p. 195). Young people with higher levels of spider anxiety had a significantly greater number of these kinds of negative errors in their recall of the vignettes. The authors stated that most of these negative memory errors (78%) corresponded to the negative interpretations that these young people had previously given. Moreover, avoidance in relation to a spider was assessed after children had reported their memories for the vignettes; a fake spider was put in a box and the extent to which young people approached the box was observed. Young people who made a greater number of negative errors in recall were less likely to approach the box.

The results show that children with higher levels of spider anxiety have interpretation biases for ambiguous spider-themed information, and subsequently recall this information in a negative manner perhaps because of their interpretation biases (Klein et al., 2014). Additionally, there is evidence that memory bias for ambiguous information may influence

avoidance behaviours, supporting the prediction that memory biases in anxiety perpetuate avoidance thereby maintaining anxiety (Hertel et al., 2008).

The relationship between interpretation bias and memory bias, with respect to novel animals, was investigated by Field and Field (2013). Here, I provide a detailed review of this study as I aim to replicate Field and Field's (2013) paradigm in Study 1. A paradigm introduced by Field and Lawson (2003) was used to investigate these relationships. This paradigm has been used in many studies to investigate whether verbal information about novel animals impacts children's avoidance behaviour and fear beliefs (for a review of findings see: Muris & Field, 2010). The procedure typically involves presenting children with information about novel animals and then assessing whether this information impacts their fear beliefs regarding how dangerous the animal is and their avoidance behaviour in relation to the novel animals. In general, the provision of negative information, inferring that the animal is scary or dangerous, leads to increases in fear beliefs and avoidance relative to when children receive no information or information that implies that the animal is friendly. Novel animals are chosen to control for pre-existing beliefs and because fears relating to animals are prevalent, relative to other kinds of fears, in children (e.g., Muris, Merckelbach, Gadet, & Moulaert, 2000).

In Field and Field's (2013) study, children (ages 8-11 years) heard ambiguous information about a novel animal and were then interviewed to assess their interpretations and their memories for that information. Children's interpretations were coded for whether they interpreted the ambiguous information in a benign or negative manner. Children's memories were coded for whether they remembered the ambiguous information in an accurate manner, or whether they had intrusions in recall that were of a benign or negative theme. Children's explicit fear beliefs (assessed via questionnaire) and avoidance behaviour relating to the novel animal, were assessed before and after hearing the ambiguous information to understand whether hearing the information increased their fear beliefs and avoidance. Avoidance behaviours were assessed using a 'nature reserve', which involved children placing a figurine on a board to indicate how close they would be willing to get to the novel animal.

Field and Field (2013) hypothesised that children who had a greater number of negative interpretations (i.e., an interpretation bias) would also report a greater number of negative memories, and in turn would show a greater increase in their fear and avoidance of the novel animal. In other words, negative memories would mediate the relationship between interpretation bias and children's fear and avoidance.

Interpretation bias (a greater number of negative interpretations) was correlated with a greater number of negative memories and fewer benign memories of the novel animal. Contrary to hypotheses, however, fewer benign memories mediated the relationship between interpretation bias and children's fear beliefs and avoidance of the novel animal. That is, children who interpreted the ambiguous information in a negative way had fewer benign memories of the animal, and in turn showed a greater increase in their fear beliefs and avoidance behaviour towards the animal. This result suggested that benign memories, rather than negative memories, may be of more importance in the acquisition of fear following exposure to ambiguous information, and that benign memories may possibly have a buffering effect.

Despite finding a relationship between interpretation bias and memory bias, anxiety was not significantly correlated with either of these cognitive biases. Anxiety was only found to be significantly positively correlated with children's fear and avoidance, indicating that children who had higher levels of anxiety had a greater increase in these variables after hearing ambiguous information about the novel animal.

A non-significant relationship between anxiety and interpretation bias contrasts with a large body of previous research (see Table 2.1). Field and Field (2013) suggested that the non-significant relationship in their study may have occurred because interpretation biases act as a risk factor for anxiety. In other words, interpretation biases may precede the onset of high levels of anxiety in children and therefore there were children with high levels of interpretation bias who did not have higher levels of anxiety. While this first possibility is plausible, a second explanation put forth by Field and Field (2013) was that the specificity of the interpretation bias measure, which only assessed interpretation bias in relation to a novel animal, may have led to a non-significant relationship between anxiety and interpretation bias. In contrast, previous studies have assessed interpretation biases towards a range of ambiguous scenarios (see Table 2.1). While some children with higher levels of anxiety may be more prone to exhibiting interpretation biases towards novel animals, it could also be the case that other children with higher levels of anxiety will exhibit interpretation biases towards other types of ambiguous information. I aimed to investigate this second possibility in Study 1 by replicating Field and Field's (2013) paradigm but adding an additional measure for interpretation bias, which assessed children's interpretation biases towards a range of ambiguous scenarios.

The lack of research regarding the relationship between anxiety and memory biases in young people creates a challenge in generating explanations for Field and Field's (2013) non-

significant results. Previous research has shown that young people with higher levels of anxiety have superior recall of negatively valenced stimuli (e.g., Daleiden, 1998; Reid et al., 2006) and it is possible that a memory bias in anxiety only occurs when individuals with higher levels of anxiety are asked to recall overtly negative stimuli. Yet, Klein et al. (2014) found that young people with higher levels of spider anxiety had memory biases for ambiguous vignettes relating to spiders. There is also research suggesting that memory biases occur when adults with higher levels of anxiety are asked to recall ambiguous information (Hertel & Brozovich, 2010).

An aspect of Field and Field's (2013) study, that could have influenced the relationships between anxiety and other key variables, was that anxiety was assessed using the State-Trait Anxiety Inventory for Children (STAIC; Spielberger, 1973). The STAIC (Spielberger, 1973) was developed from a questionnaire designed for adults, which presumes that anxiety symptoms in children and adults are similar (Spence, 1998). Yet the STAIC does not capture the full range of anxiety symptoms that are prevalent in children, such as separation anxiety and fears of physical harm (Muris, Merckelbach et al., 2000; Ollendick, Grills, & Alexander, 2001). Moreover, the STAIC (Spielberger, 1973) may capture negative affect rather than 'pure' anxiety as there are items that assess tearfulness and unhappiness (Bieling, Antony, & Swinson, 1998; Reiss et al., 2001). Speculatively, the STAIC (Spielberger, 1973) may have been too narrow to capture the range of anxiety symptoms that children experience, but also too broad in that it assesses general negative affect, which may have obscured correlations between anxiety and other variables that may be associated with anxiety. A research question arising from this is whether Field and Field's (2013) results are replicable with an alternative assessment of anxiety that has been developed specifically to capture anxiety symptoms in children.

Overall Conclusions

Cognitive biases are predicted to contribute to the development and maintenance of anxiety in adults and young people (e.g., Hirsch et al., 2006; Kendall, 1985; Muris & Field, 2008). A large body of literature has established an association between anxiety and interpretation biases in young people but a limited number of studies have investigated the relationship between anxiety and memory biases in young people. Yet interpretation biases are predicted to create memory biases for ambiguous information and events (Hertel & Brozovich, 2010). The relationship between interpretation bias and memory bias is proposed to be involved in the maintenance and development of anxiety by eliciting anxious affect,

encouraging avoidance behaviours, and contributing to a threatening worldview (Hertel et al., 2008; Mathews & Mackintosh, 2000; Muris & Field, 2008).

Only two studies have investigated the relationships amongst anxiety, interpretation bias, and memory bias in young people (Field & Field, 2013; Klein et al., 2014). The findings suggest that young people who tend to interpret ambiguous information in a negative manner also tend to remember this information in a negative manner. Yet there are inconsistencies regarding the relationships between anxiety and cognitive biases in these two studies. Field and Field (2013) suggested that their non-significant relationship between anxiety and interpretation bias may be because this cognitive bias precedes the onset of anxiety in children. These results warrant replication as it may be critical for our understanding of how cognitive processes may enhance young people's risk for anxiety in the future, or maintain anxiety throughout childhood.

Aims and Hypotheses for Study 1

The main aim of the current study was to investigate the relationships amongst anxiety, interpretation bias, and memory bias in children (ages 8-11 years). I employed the paradigm by Field and Field (2013), as it is based on a well-established paradigm that investigates children's fear and avoidance (see: Field & Lawson, 2003; Muris & Field, 2010). Thus, children in the current study heard ambiguous information about a novel animal. Children's interpretations, memories, fear beliefs and avoidance behaviour, were assessed in relation to the ambiguous information that they heard. I also extended the previous study by Field and Field (2013) by assessing interpretation biases in relation to a range of ambiguous scenarios.

There were four hypotheses, with the first hypothesis encompassing the core research aim of investigating the relationship between interpretation bias and memory bias in children:

(1) The first hypothesis was that children who made a greater number of negative interpretations in response to ambiguous information about a novel animal, would also report a greater number of negative memories and fewer benign memories about the novel animal.

(2) The second hypothesis was that, following Field and Field (2013), fewer benign memories would mediate the relationship between interpretation bias and children's fear and avoidance of a novel animal. In other words, children who made a greater number of negative interpretations would have fewer benign memories, and in turn would have a greater increase in their fear beliefs and avoidance in relation to the novel animal.

(3) The third hypothesis was that interpretation bias and anxiety would be positively correlated, but only when interpretation bias was assessed in relation to a range of ambiguous scenarios, and not solely in relation to a novel animal.

(4) I also hypothesised that there would be effects of gender. I expected to find that girls would report higher levels of anxiety and interpretation biases than boys.

In addition to the core aims and hypotheses, I also investigated a research question regarding the anxiety assessment employed. Because Field and Field (2013) assessed children's anxiety using the STAIC (Spielberger, 1973), which has been critiqued for being a measure of negative affect and for being a 'downward extension' of an adult questionnaire (Spence, 1998), I investigated whether Field and Field's (2013) results were replicable when utilising a questionnaire that does not have these potential limitations.

Method

Participants

Participants were 62 children (whole sample $M = 10.1$ years, $SD = 0.8$; 26 girls, $M = 9.5$, $SD = 0.9$; 36 boys, $M = 9.6$ years, $SD = 0.9$) recruited from three primary schools in Wellington, New Zealand/Aotearoa. This age group was chosen in order to match the sample chosen by Field and Field (2013). In addition, fears of animals are common in children of this age and the research stimuli (novel animals) are relevant for children (Muris, Merckelbach et al., 2000). Principals from five primary schools were contacted and given information about the study. Three principals agreed to take part in the study (two declined) and permission was gained from the principals to distribute information letters and consent forms for children to take home. Only children who returned signed parental consent forms participated in the study. This research project received approval from the Department of Psychology Human Ethics Committee under delegated approval powers granted by the Victoria University of Wellington Human Ethics Committee.

Materials

Novel animals – ambiguous information and pictures. Ambiguous information about either a Cuscus or a Quokka (Australian marsupials) and subsequent questions about the novel animals were identical to those used by Field and Field (2013). The information provided to children described how the animal looks, where it lives, how it behaves, and what it eats and drinks (Appendix B). For example, "Cuscuses/Quokkas have big sharp claws that they use to dig and scratch". Children were also shown pictures (13cm by 11 cm) of the Cuscus and of the Quokka before reporting their fear beliefs, and the pictures were also used

when assessing children's avoidance. One of the animals served as a *control* as children did not hear any information about this animal, and one of the animals served as *target* animal that children heard the ambiguous information about; this was counterbalanced across children.

Nature reserve task (NRT; Field & Storksen-Coulson, 2007). The NRT was used to assess behavioural avoidance regarding the novel animals (more information in next section). The board used in the current study (55cm by 45 cm) was designed to look like a miniature landscape with grass and trees, and a pathway running up the middle. A small figurine was used to represent the child so that they could place the figurine on the pathway to indicate how close they would get to each animal.

Measures and Tasks

Anxiety - Spence Children's Anxiety Scale (SCAS; Spence, 1998). The SCAS is a 38-item self-report questionnaire for anxiety, originally developed for use with community samples of children between the ages of eight and 12 years. The SCAS was developed to capture a range of anxiety symptoms that are common in children of this age. The SCAS has been used previously in research regarding interpretation biases and memory biases in children (e.g., Creswell & O'Connor, 2010; Dodd et al., 2015; Muris et al., 2003; Watts & Weems, 2006) and is widely used in research on anxiety in children (Orgilés, Fernández-Martínez, Guillén-Riquelme, Espada, & Essau, 2016). Unlike the STAIC (Spielberger, 1973) the SCAS does not have items that capture tearfulness and unhappiness, which are not specific to anxiety. I used a modified version of the SCAS (M-SCAS; Lagattuta, Sayfan, & Bamford, 2012) that altered the previous version in three ways: (1) exclusion of items that might be misinterpreted by children, for example, "I have to do things over and over again like washing my hands", (2) adding items that capture common fears and anxiety symptoms in children, for example, "I have scary dreams", (3) the use of a pictorial answer scale as opposed to children circling on a response form, "Never", "Sometimes", "Often", or "Always", as in the original questionnaire. The pictorial answer scale depicted five rectangles representing the following: *none of the time* (empty vertical rectangle), *a little bit of the time* (rectangle filled ¼ with blue), *some of the time* (rectangle filled ½ with blue), *a lot of the time* (rectangle filled ¾ with blue), and *all of the time* (blue rectangle). The questionnaire used in the current study had 30 items, with an additional five filler items, presented on laminated cards. Questions assessed generalised anxiety, social anxiety, separation anxiety, physical injury fears, and panic symptoms. Internal reliability of the total score for this study was $\alpha = .92$.

Interpretation bias for a range of scenarios- ambiguous vignettes paradigm (AVP). Fifteen ambiguous vignettes (Appendix A), reflecting possible scenarios from children's everyday lives, were drawn from several previous studies (Barrett et al., 1996; Bögels et al., 2003; Muris, Merckelbach, & Damsma, 2000; Muris et al., 2003). An example of a vignette depicting a potential social threat was: "Jane's teacher tells Jane that she has to give a speech in class. Jane stands up in front of the class. During the speech her classmates start to laugh". To assess interpretation biases, children were asked two questions: (1) "What do you think will happen next in the story", (2) "What would you do in this situation?".

Fear beliefs– fear beliefs questionnaire (FBQ; Field & Lawson, 2003). The FBQ consisted of seven questions relating to children's thoughts, anticipated behavioural responses, and anticipated physiological reactions towards novel animals. For example, "Do you think a Cuscus/Quokka would hurt you?" and "Would you go up to a Cuscus/Quokka if you saw one?". Children respond on a 5-point likert scale with the following options: 1 = *no, not at all*, 2 = *no, not really*, 3 = *maybe*, 4 = *yes, probably*, 5 = *yes, definitely*.

Children completed the FBQ for both the Quokka and the Cuscus. A fear beliefs score was calculated to give the change in fear beliefs for the *target* animal relative to change in fear beliefs for the *control* animal. More information regarding this change score is given in the results section.

Avoidance behaviour- nature reserve task (NRT; Field & Storksen-Coulson, 2007). The NRT was used to assess behavioural avoidance regarding the novel animals. Children were asked to imagine that the miniature landscape was a nature reserve that they were visiting. The researcher placed a picture of one of the animals at the end of the board and children were asked to place the figurine where they would like to be if they visited the nature reserve. The distance in centimetres the figurine was placed from the animal operationalised avoidance. This was carried out for the target and control animal separately. Similar to fear beliefs, following Field and Field (2013), a change score was calculated for avoidance behaviour and more information is given in the results section.

Interview to assess interpretation bias and memories regarding the novel animal. Questions to assess children's interpretation bias and memories for the ambiguous information about a novel animal were conducted in an interview format, identical to that used by Field and Field (2013). The interview began with a free recall memory question; "Tell me everything you remember about the Cuscus/Quokka". Following free recall, children were asked four prompted memory questions to assess their memory for different aspects of the animal (i.e., how it looks, where it lives, how it behaves, and what it

eats/drinks), for example, “What can you remember about how the Cuscus/Quokka looks?”. Each prompted memory question was followed by a series of open and forced choice questions that related to each memory prompt, and that assessed children’s interpretation biases. For example, an open question regarding the way the animal looked was “Cuscuses have long sharp claws that they use to scratch, what do you think they scratch?”, and the accompanying forced choice question was “Which of these do you think is the most likely, they scratch humans and other animals, or they scratch trees?”. See Appendix C for full interview.

Procedure

Each child took part in two separate sessions of approximately 30-minutes duration each, on consecutive days at school. During the first session, the child was assisted in completing the anxiety questionnaire. This began with the researcher explaining what each rectangle on the pictorial answer scale meant. The child’s understanding of the scale was tested by asking them to point to different responses (e.g., “point to the rectangle which means *a little bit of the time*”). This was followed by a series of practice questions unrelated to anxiety that also served to build rapport, such as “I like to eat worms” and “I watch movies”. Thereafter, the child’s interpretation biases towards a range of scenarios were assessed via the ambiguous vignettes paradigm (AVP). To introduce the AVP, the child was told that they were going to hear some short stories about a girl/boy of the same age as them, and that after each story there would be some questions. To assess their interpretation biases, the child was asked “what do you think will happen next?” and “what would you do in that situation?” after each vignette. Children’s responses to these questions were audio recorded using a dictaphone.

On the second day, session two was introduced by telling each child that they were going to learn about some animals, listen to a story, and answer some questions. The child was then shown a picture of the Cuscus and a picture of the Quokka and asked if they had heard of these animals before; none of the children reported having heard of either the Cuscus or the Quokka before the study. Next, the child’s baseline fear beliefs and avoidance towards each of the novel animals was assessed via the completion of the FBQ and NRT. Following this the researcher read the ambiguous information aloud. Children heard information about a Quokka or a Cuscus, counterbalanced across children. After hearing the ambiguous information, children were taken to a different researcher in a separate room.

The second researcher immediately began the interview to assess children’s memories and interpretation biases. The interview began with the free recall prompt “Tell me

everything you remember about the Cuscus/Quokka”. The researcher gave non-directive prompts such as “mhmm” until the child appeared to have reported everything they could recall. After the free recall period, the child then completed the post-assessment FBQ and NRT. Finally, the researcher completed the rest of the interview which involved four prompted questions about the animal to assess the child’s memories, and open and forced choice questions to assess interpretation biases towards the novel animal.

Coding

Coding of interpretation bias for the ambiguous vignettes paradigm. Children’s responses to the prompt “What do you think will happen next” and the prompt “What would you do in this situation”, were coded separately.

When asked what would happen next, children’s responses were coded as either a benign interpretation (scored zero), or a negative interpretation (scored one). Benign interpretations were any that suggested that the situation would have a benign rather than a negative outcome, for example, “she will just keep going with her speech”. Negative interpretations involved any responses suggesting that something bad would happen to the target character, such as getting hurt or feeling scared, for example, “her classmates might bully her”. Thus, higher scores reflected a greater number of negative interpretations.

When asked what they would do in each situation, children’s responses were coded as either an approach response (scored zero) or an anxious/avoidant response (scored one). Approach responses were any that did not include anxious/avoidant plans and may have suggested coping behaviours, for example, “I wouldn’t care, I would just keep going”. Anxious/avoidant responses involved either reassurance, reporting negative affect, escape from the situation, or avoidance behaviours, for example, “I would run away”. Thus, higher scores reflected a greater number of anxious/avoidant behavioural plans.

Responses were coded by the primary researcher (see Appendix A for vignettes and coding scheme). Reliability was assessed via the independent coding of a random selection of 20% of cases by a psychology postgraduate student ($ICC = .91$) who had been trained by the primary researcher.

Coding of interpretation bias for the novel animal. Children’s responses to open questions were coded as either a benign interpretation (scored zero), or a negative interpretation (scored one). Benign interpretations were any responses that suggested that the animal was non-threatening. Negative interpretations were responses that suggested that the

animal represented a threat, was scary, or could potentially cause harm. For example, when asked “Cuscuses have long sharp claws that they use to scratch, what do you think they scratch?”, a benign interpretation was “bark and dirt” whereas a negative interpretation was “humans”. Responses were coded by the primary researcher. Reliability was assessed via the independent coding of 20% of cases by a psychology postgraduate student ($ICC = .80$) who had been trained to use the coding scheme. Scores for the open and forced choice questions were combined to give a total interpretation bias score for the novel animal, with a higher score reflecting greater levels of interpretation bias. See Appendix E for coding scheme.

Coding of memories for the novel animal. Children’s memories for the ambiguous information about a novel animal were transcribed, separated into statements, and coded as belonging to one of the following categories: correct, negative memory, benign memory, irrelevant memory (Appendix D for coding scheme). Correct memories were coded as accurate recollection of the original information, for example, “the Cuscus feeds on all sorts of things”. Negative memories were coded as memories where the animal was remembered negatively, for example, “the Cuscus eats humans”. Benign memories were memories where the animal was remembered in a benign manner, for example, “the Cuscus eats berries and grubs”. Irrelevant memories reflected memories that were not included in the original information and contained information about the animal that was neither negative nor benign, for example, “the Cuscus keeps food in its nest”. Memories were coded by the primary researcher. Reliability was assessed via the independent coding of a random selection of 20% of cases by a psychology postgraduate student, trained to use the coding scheme (Cohen’s $\kappa = .84$).

Results

Data Analysis Strategy

Pearson correlation coefficients were conducted to investigate the main hypotheses and research questions. Point-biserial correlations were conducted for any correlations involving gender. Following Field and Field (2013), bias-corrected accelerated (BCa) confidence intervals (95%) were constructed using bootstrapping (1000 samples) around all estimates. Constructing confidence intervals in this way has been recommended in situations where data do not meet parametric assumptions (Chan & Chan, 2004; Efron & Tibshirani, 1993). Confidence intervals that do not include zero indicate a statistically significant effect (Field, 2009). Cohen’s (1992) conventions to interpret effect sizes for correlation coefficients were also utilised: $.10 = \text{small}$, $.30 = \text{moderate}$, $.50 = \text{large}$.

A change in children's fear beliefs (FBQ score) was calculated by subtracting fear beliefs pre-information from fear beliefs post-information. This change score was calculated separately for the *target* animal (i.e., the animal for which ambiguous information was provided) and the *control* animal. Change in fear beliefs for the control animal was then subtracted from change in fear beliefs for the target animal. Change in avoidance behaviour (NRT score) was calculated in the same way as change in fear beliefs. A change score of zero, therefore, indicates that there was an equivalent change (from pre- to post-information) in fear beliefs and/or avoidance for both the target animal and the control animal. A positive score indicates that there was a greater increase in fear beliefs and/or avoidance for the target animal relative to the control animal.

Descriptive Statistics and Preliminary Analyses

Descriptive statistics for all the variables are shown in Table 2.2. Children's mean anxiety levels were comparable to previous research (Lagattuta et al., 2008) and indicated that, on average, children endorsed "*a little bit of the time*" for each item on the questionnaire. A range of scores were observed for children's interpretation biases (i.e., negative interpretations and anxious/avoidant plans) assessed via the AVP; it was possible to get a total score of 15 for each of these variables. A range of scores were also observed for children's interpretation biases towards the novel animal (IBanimal) and the mean was comparable to Field and Field's (2013) results.

Children's mean scores for their change in fear beliefs (Δ Fear Beliefs) and avoidance (Δ Avoidance) regarding the novel animal were both positive, indicating that children showed a greater increase in their fear beliefs for the target animal relative to the control animal from pre- to post-information. Paired-samples *t*-tests were conducted to assess if there was a statistically significant increase in children's fear beliefs (FBQ) and avoidance behaviours (NRT) from pre-information to post-information for both the target animal and the control animal.

Post-information FBQ scores for the target animal were on average higher ($M = 1.98$, $SE = 0.10$) than pre-information FBQ scores for the target animal ($M = 1.64$, $SE = 0.08$). This difference, 0.34, BCa 95% CI [-0.51, -0.20], was significant $t(61) = -4.40$, $p = .00$. On average, post-information FBQ scores for the control animal ($M = 1.57$, $SE = 0.10$) were higher than the pre-information FBQ scores for the control animal ($M = 1.49$, $SE = 0.09$). However, this difference, 0.08, BCa 95% CI [-0.18, 0.02], was non-significant $t(61) = -1.55$, $p = .13$. A similar pattern emerged with the NRT scores. Post-information NRT scores for the target animal were on average higher ($M = 20.32$, $SE = 1.34$) than pre-information NRT

scores for the target animal ($M = 18.39$, $SE = 1.21$). This difference, 1.94, BCa 95% CI [-0.385, -0.02], was significant $t(61) = -0.201$, $p = .05$. For the control animal, post-information NRT scores were on average lower ($M = 15.84$, $SE = 1.39$) than pre-information NRT scores ($M = 16.23$, $SE = 1.38$). This difference, 0.39, BCa 95% CI [-0.93, 1.70], was non-significant $t(61) = 0.59$, $p = .56$. These results indicate, consistent with Field and Field (2013), that children's fear beliefs and avoidance increased after hearing ambiguous information about a novel animal, but only for the target animal and not for the control animal for which no information was given.

Regarding memories, correct memories were the most common kind of memory reported by children. It was possible to get a total score of 94 for correct memories and therefore children were, on average, able to correctly recall approximately one third of the ambiguous information that they heard. The remaining memory categories represent the total number of instances that children reported these kinds of memories and did not have an upper possible limit.

Table 2.2
Descriptive Statistics for All Variables

	Minimum Observed	Maximum Observed	<i>M</i>	<i>SD</i>
Age (months)	97	137	121	10
Anxiety	3	69	30.36	13.64
AVPnegative	1	14	8.77	2.92
AVPanxious/avoidant	0	13	6.31	2.73
IBanimal	3	28	13.90	1.51
Δ Fear Beliefs	-0.57	2.14	0.26	0.57
Δ Avoidance	-15cm	31cm	2.32cm	7.77cm
Correct Memories	5	33	19.47	6.39
Irrelevant Memories	0	3	0.79	0.86
Negative Memories	0	9	3.00	2.04
Benign Memories	0	4	0.73	1.07

Note. AVP = interpretation bias as assessed via the ambiguous vignettes paradigm; AVPnegative = number of negative interpretations when children were asked what they thought would happen next; AVPanxious/avoidant = number of anxious/avoidant behavioural plans when children were asked what they would do; IBanimal = interpretation bias for the novel animal operationalised as number of negative interpretations given in response to the ambiguous information; Δ Fear Beliefs = change in fear beliefs (FBQ score) from pre- to post-information; Δ Avoidance = change in avoidance behaviour (NRT score) from pre- to post-information.

Main Analyses

Pearson correlation coefficients testing the hypotheses are shown in Table 2.3 while the corresponding BCa confidence intervals (95%) for these effects are shown in Table 2.4.

The first hypothesis was that children who made a greater number of negative interpretations in response to ambiguous information about a novel animal, would also report

a greater number of negative memories and fewer benign memories about the novel animal. This hypothesis was supported as Table 2.3 shows a significant positive correlation of a moderate to large size between interpretation bias relating to the novel animal (IB_{Animal}) and negative memories. That is, children who tended to interpret ambiguous information about a novel animal in a negative manner, also reported a greater number of negative memories for this information. Likewise, a significant negative correlation of small to moderate size was observed between IB_{Animal} and benign memories. This correlation indicated that children who tended to interpret the ambiguous information about a novel animal in a benign manner, also had a greater number of benign memories for this information.

The second hypothesis was that, following Field and Field (2013), fewer benign memories would mediate the relationship between interpretation bias and children's fear beliefs and avoidance of the novel animal. This was not supported as Table 2.3 shows that benign memories were not significantly correlated with either children's change in fear beliefs (Δ Fear Beliefs) or avoidance behaviour (Δ Avoidance). Additionally, children's interpretation bias regarding the novel animal (IB_{Animal}) was not significantly correlated to their change in fear beliefs or avoidance behaviour. Mediation analyses for these variables was not justified.

The third hypothesis was that interpretation bias and anxiety would be positively correlated, but only when interpretation bias was assessed in relation to a range of ambiguous scenarios and not solely in relation to a novel animal. This hypothesis was partially supported as Table 2.3 shows a significant positive correlation between anxious/avoidant responses on the ambiguous vignettes paradigm (AVP_{anxious/avoidant}) and children's anxiety. That is, children with higher levels of anxiety were more likely to give anxious/avoidant behavioural plans in response to the ambiguous vignettes. The correlation between anxiety and interpretation bias towards the novel animal was non-significant. Additionally, children's negative interpretations on the AVP (AVP_{negative}), were not significantly correlated with anxiety.

The fourth hypothesis was that girls would have higher levels of anxiety and interpretation biases than boys. A significant negative correlation was found between gender and the AVP_{anxious/avoidant} responses. This indicated that girls gave a greater number of anxious/avoidant plans in response to the ambiguous vignettes. No further significant correlations were found for gender.

Three significant correlations were also identified post hoc. First, there was a significant positive correlation between anxiety and negative memories. This indicated that

children with higher levels of anxiety reported a greater number of negative memories after hearing ambiguous information about a novel animal. Second, a significant positive correlation was also found between anxiety and irrelevant memories. In contrast, Field and Field (2013) did not find any significant relationships between anxiety and memories. Third, a significant negative correlation was found between correct memories and children's avoidance. This indicated that children who reported a greater number of correct memories were less likely to show an increase in their avoidance towards the target animal following the ambiguous information.

Table 2.3
Correlations between Key Variables

	Gender	Anxiety	AVPnegative	AVPAnxious/ avoid	IBanimal	Correct Memories	Irrelevant Memories	Negative Memories	Benign Memories	ΔFear Beliefs	ΔAvoidance
Age	.03	.01	-.19	-.14	.08	.15	.04	-.01	.12	-.09	.03
Gender	-	-.09	-.12	-.31*	.17	.03	.06	.16	.03	.07	-.03
Anxiety		-	.21	.32*	.22	-.14	.30*	.30*	-.01	.12	.05
AVPnegative			-	.57**	.11	-.03	.05	.10	.06	.09	-.03
AVPAnxious/ avoid				-	.07	-.11	.16	.00	.02	.21	-.04
IBanimal					-	-.21	.07	.46**	-.27*	.20	-.01
Correct Memories						-	.17	-.04	.26*	.07	-.24*
Irrelevant Memories							-	.02	.03	.21	.01
Negative Memories								-	.02	.01	.00
Benign Memories									-	-.01	-.03
ΔFear Beliefs										-	-.07

Note. AVP = interpretation bias as assessed via the ambiguous vignettes paradigm; AVPnegative = number of negative interpretations when children were asked what they thought would happen next; AVPAnxious/avoid = number of anxious/avoidant behavioural plans when children were asked what they would do; IBanimal = interpretation bias for the novel animal operationalised as number of negative interpretations given in response to the ambiguous information; ΔFear Beliefs = change in fear beliefs (FBQ score) from pre- to post-information; ΔAvoidance = change in avoidance behaviour (NRT score) from pre- to post-information.
* $p < .05$. ** $p < .01$.

Table 2.4
Bootstrapped BCa Confidence Intervals (95%) for the Effect Sizes in Table 2.3

	Gender	Anxiety	AVPnegative	AVPanxious/ avoid	IBanimal	Correct Memories	Irrelevant Memories	Negative Memories	Benign Memories	ΔFear Beliefs	ΔAvoidance
Age	[-.21, .26]	[-.27, .28]	[-.40, .04]	[-.32, .07]	[-.16, .33]	[-.08, .36]	[-.20, .25]	[-.25, .23]	[-.14, .38]	[-.34, .14]	[-.23, .29]
Gender		[-.34, .18]	[-.32, .15]	[-.51, -.05]	[-.09, .43]	[-.23, .32]	[-.23, .33]	[-.09, .38]	[-.21, .26]	[-.18, .28]	[-.28, .21]
Anxiety			[-.03, .42]	[.09, .52]	[-.03, .42]	[-.36, .11]	[.02, .54]	[.04, .53]	[-.28, .26]	[-.14, .37]	[-.16, .29]
AVPcognitive				[.35, .74]	[-.09, .32]	[-.27, .22]	[-.22, .28]	[-.14, .33]	[-.18, .20]	[-.13, .28]	[-.33, .34]
AVPanxious/ avoid					[-.17, .32]	[-.38, .22]	[-.14, .39]	[-.17, .30]	[-.22, .31]	[-.01, .36]	[-.28, .24]
IBanimal						[-.42, .01]	[-.14, .32]	[.27, .62]	[-.50, -.04]	[-.02, .40]	[-.24, .31]
Correct Memories							[-.07, .37]	[-.24, .21]	[.06, .44]	[-.13, .29]	[-.44, -.03]
Irrelevant Memories								[-.26, .31]	[-.20, .27]	[-.06, .48]	[-.27, .30]
Negative Memories									[-.20, .23]	[-.24, .29]	[-.21, .21]
Benign Memories										[-.24, .23]	[-.24, .26]
ΔFear Beliefs											[-.15, .40]

Note. AVP = interpretation bias as assessed via the ambiguous vignettes paradigm; AVPnegative = number of negative interpretations when children were asked what they thought would happen next; AVPanxious/avoid = number of anxious/avoidant behavioural plans when children were asked what they would do; IBanimal = interpretation bias for the novel animal operationalised as number of negative interpretations given in response to the ambiguous information; ΔFear Beliefs = change in fear beliefs (FBQ score) from pre- to post-information; ΔAvoidance = change in avoidance behaviour (NRT score) from pre- to post-information.

Discussion

The current study investigated the relationships between anxiety, interpretation bias, and memory bias in children. I implemented a paradigm used previously by Field and Field (2013) to investigate these relationships and by doing so, aimed to replicate their findings.

Children heard ambiguous information about a novel animal. Following this, their interpretations and memory for this information were assessed. Children's fear beliefs and avoidance behaviours regarding the novel animal were also assessed before and after hearing the ambiguous information. In addition to this replication, I extended Field and Field's (2013) study to include an assessment of interpretation bias towards a range of ambiguous situations to aid in understanding why the previous study (by Field & Field, 2013) may not have found a relationship between interpretation bias and anxiety.

There were four hypotheses. First, following Field and Field (2013), I hypothesised that children who made a greater number of negative interpretations in response to ambiguous information about a novel animal, would report a greater number of negative memories and fewer benign memories. This was supported. Second, following Field and Field (2013), I hypothesised that fewer benign memories would mediate the relationship between interpretation bias and children's fear beliefs and avoidance towards a novel animal. This was not supported. Third, I hypothesised that interpretation bias and anxiety would be positively correlated, but only when interpretation bias was assessed in relation to a range of ambiguous scenarios, and not specifically towards a novel animal. This hypothesis was supported. Fourth, I hypothesised that girls would report higher levels of anxiety and interpretation biases than boys. This was partially supported. I now review each hypothesis in turn.

Results in Relation to the Hypotheses

The first hypothesis was that children who made a greater number of negative interpretations in response to ambiguous information about a novel animal, would report a greater number of negative memories and fewer benign memories regarding this information.

Consistent with this hypothesis, interpretation bias was significantly positively correlated with negative memories, and negatively correlated with benign memories for the ambiguous information. These results are consistent with the previous study by Field and Field (2013). Together these findings suggest that children who tend to interpret ambiguous information in a negative way are also more prone to recalling that information in a negatively imbued way. While, interpretation bias is predicted to cause a memory bias for ambiguous information, specifically by causing negative memories for this kind of

information. Findings of the current study, and two previous studies with similar methodology and findings (Field & Field, 2013; Klein et al., 2014), cannot establish whether the relationship between interpretation bias and memory bias is causal. Experimental research is needed to establish whether a causal relationship exists between interpretation bias and memory bias. This causal relationship between interpretation bias and memory bias is predicted to be involved in the development and maintenance of anxiety disorders (Hertel et al., 2008; Mathews & Mackintosh, 2000).

The second hypothesis was that benign memories would mediate the relationship between interpretation bias and children's fear beliefs and avoidance of the animal. That is, I hypothesised that children who made a greater number of negative interpretations would report fewer benign memories of the novel animal, and in turn they would show a greater increase in their fear beliefs and avoidance of the novel animal. This hypothesis was not supported. Based on the lack of basic relationships amongst the hypothesised variables I did not run the mediation analysis. These current results are inconsistent with Field and Field's (2013) findings, who demonstrated that children who made negative interpretations towards the novel animal reported fewer benign memories and in turn reported a greater increase in fear and avoidance towards the animal. Field and Field (2013) stated that their results highlighted the potential importance of benign memories, rather than negative memories, in children's acquisition of fears, which also raised the possibility that benign memories act as a buffer against the development of fear. It is unclear why the current findings were non-significant, but it is possible that there was insufficient power to detect these effects due to a smaller sample size ($N = 62$) than Field and Field (2013) ($N = 187$). Only children's correct memories were found to be significantly associated with avoidance behaviour in the current study, and this is discussed further under post hoc findings.

The third hypothesis was that interpretation bias and anxiety would be positively correlated, but only when interpretation bias was assessed in relation to a range of ambiguous scenarios and not specifically in relation to a novel animal. This hypothesis was supported in that children with higher levels of anxiety were more likely to give anxious/avoidant behavioural plans when asked what they would do in response to ambiguous vignettes depicting a range of scenarios. Yet the relationship between anxiety and interpretation bias specifically in relation to a novel animal was non-significant, and this is consistent with the previous study by Field and Field (2013). Field and Field (2013) suggested two possibilities for their non-significant relationship between anxiety and interpretation bias towards a novel animal. First, it may have occurred because interpretation bias acts a risk factor for anxiety

and therefore precedes anxiety onset in children. Second, the stimulus towards which interpretation bias was assessed (a novel animal) was too narrow. The current findings from Study 1 support this second possibility and suggest that interpretation biases may be somewhat idiosyncratic. In other words, there is variation across children in the kinds of ambiguous situations they find threatening. Assessing interpretation bias only in relation to a single stimulus may be too narrow to capture the range of situations that children might find threatening. While the current findings do not rule out the possibility that interpretation bias may act as a risk factor for anxiety in children, and thus precede anxiety onset, longitudinal research is needed to answer this question.

Although anxiety was significantly correlated with anxious/avoidant plans when presented with ambiguous vignettes, children did not make a greater number of negative interpretations when asked what they thought would happen next in response to the ambiguous scenarios. This finding is inconsistent with a body of research, including a meta-analysis, establishing a relationship between interpretation bias and higher levels of anxiety in children (e.g., Stuijzand et al., 2017). However, previous research has suggested that responding with avoidant behavioural plans, rather than negative interpretations, may be a key feature of anxiety when confronted with ambiguous vignettes, while children with oppositional problems also endorse negative interpretations in response to ambiguous vignettes (Barrett et al., 1996; Creswell & O'Connor, 2010; Reid et al., 2006). It could be that there were children with oppositional difficulties in the current sample who were also endorsing negative interpretations, thereby reducing the relationship between anxiety and negative interpretations. Another possibility is that the lack of association may be expected considering previous research showing that the association between anxiety and interpretation bias is stronger when interpretation bias is operationalised as anticipated distress rather than negative interpretations (e.g., Creswell & O'Connor, 2010; Waters, Craske et al., 2008).

The fourth hypothesis was that girls would show greater levels of anxiety and interpretation biases than boys. The only effect of gender found was for interpretation bias assessed via the AVP. Girls were more likely than boys to give anxious/avoidant behavioural plans in response to the ambiguous vignettes. This finding is consistent with several previous studies which have shown that girls have interpretation biases to a greater extent than boys (e.g., Bell-Dolan, 1996; Higa & Daleiden, 2008; Miers et al., 2008). I did not find, however, that girls reported higher levels of anxiety than boys. This is despite several studies demonstrating that girls reported higher levels of anxiety than boys (e.g., Creswell & O'Connor, 2010; Muris et al., 2003). It is possible that endorsing a greater number of

anxious/avoidant responses may represent a vulnerability for anxiety in girls. Further research is required to understand how relationships between gender, interpretation bias, and anxiety may unfold over time.

Post Hoc Findings

Post hoc investigation showed that there was a significant positive correlation between anxiety and negative memories. That is, children with higher levels of anxiety reported a greater number of negative memories in their recall of the ambiguous information about the novel animal. Although this finding is inconsistent with Field and Field's (2013) research, it is consistent with a study by Klein et al. (2014) who found that young people who were more fearful of spiders were more likely remember spider-themed ambiguous vignettes in a negative manner. Moreover, adults with higher levels of anxiety have been found to recall ambiguity in a negative manner (Hertel et al., 2008).

Why our finding diverged from Field and Field's (2013) findings cannot be determined with certainty. The use of a different questionnaire for anxiety was a key difference in methodology between the current study and Field and Field's (2013) study and it is possible that this influenced the observed effect. Indeed, differences in effect sizes between anxiety and interpretation biases have been shown across anxiety questionnaires which raises the possibility that differences in effect sizes between anxiety and memory biases may also occur when using different questionnaires (e.g., Dodd et al., 2015; Muris et al., 2003; Muris, Kindt et al., 2000). Moreover, the STAIC (Spielberger, 1973) may capture negative affect rather than 'pure' anxiety (e.g., Bados, Gómez-Benito, & Balaguer, 2010; Reiss et al., 2001), and negative affect has been associated with memory biases for negative stimuli that are self-referential or reflect themes of sadness rather than threat (Bradley & Mogg, 1994; Gotlib et al., 2004). Information about a novel animal is not self-referential nor is it sad, and therefore a memory bias for this information may not be observed if children's negative affect is being assessed as opposed to their anxiety more specifically. Clearly, more research is needed to understand whether anxiety questionnaires influence effect sizes and findings. One solution would be to use multiple assessments of anxiety to understand whether results converge across different questionnaires, and a stronger design for the current study would have been to include several assessments of anxiety.

A further unexpected finding was that children with higher levels of anxiety, relative to lower levels of anxiety, reported a greater number of irrelevant memories. This effect was not found by Field and Field (2013). Speculatively, children with higher levels of anxiety

may have simply been reporting a greater amount of information because they were eager to please or wanted to get the 'right' answer. Another explanation may be that children with higher levels of anxiety were engaging in a greater amount of conceptual processing of the ambiguous information. Greater levels of conceptual processing can lead to errors in recall as connections form between information that is encountered and conceptual information that is activated in one's mind when the information is processed (Zaragoza, Mitchel, Payment & Drivdahl, 2011). As reviewed earlier in this chapter, Daleiden (1998) found evidence that young people with higher levels of anxiety may engage in a greater amount of conceptual processing (i.e., processing of meaning) when they encounter negatively valenced stimuli. The fact that this relationship between anxiety and irrelevant memories diverged from Field and Field's (2013) finding may also suggest that the different assessment of anxiety employed contributed to this result. This finding awaits further investigation and replication.

A third finding identified post hoc was a significant negative correlation between correct memories and avoidance towards the novel animal. This demonstrated that children who reported a greater number of correct memories for the ambiguous information were less likely to show an increase in their avoidance behaviour towards the novel animal. This post hoc relationship requires replication, but it may suggest that being able to recall ambiguity in an accurate manner may be protective against the development of avoidance behaviours that may maintain or exacerbate anxiety.

Limitations and Future Directions

There are several limitations to this study that indicate a need for further research. One issue is the ecological validity of the stimuli used (i.e., the novel animals). It is unlikely that children would come across novel animals in their daily lives. Whether the relationship between anxiety and memory bias also occurs for other kinds of ambiguous stimuli is unknown. Research in adults, however, has shown that higher levels of anxiety is associated with a negative memory bias for ambiguous vignettes involving social situations (Hertel et al., 2008). Further research should be conducted where children are asked to recall a range of ambiguous vignettes reflecting situations that may be encountered in children's daily lives.

A further limitation is that children's interpretation bias regarding the novel animal and children's memories may have been confounded by the interview used to assess these variables. The interview consisted of items to assess memories that were alternated with items to assess children's interpretation biases (See Appendix C). Specifically, there were four prompted memory questions, and each prompted memory question was followed by a series of questions to assess interpretation biases in relation to that memory prompt. For

example, the prompted memory question “What can you remember about how the Cuscus/Quokka looks?”, was followed by a series of questions to assess interpretation biases regarding the way the animal looked, such as, “Cuscuses have long sharp claws that they use to scratch, what do you think they scratch?”. The direction of effect implied by Field and Field (2013) was for interpretation bias to influence children’s memories of the novel animal. Indeed, interpretation biases are predicted to influence how ambiguous information is recalled (Hertel & Brozovich, 2010). Yet items that assessed children’s interpretation biases for different aspects of the novel animal were temporally preceded by prompted memory questions assessing those same aspects. Because the questions were ordered in this way, it is possible that children’s memories then influenced their interpretations of the ambiguous information regarding the novel animal. A better method would have been to assess children’s interpretation biases immediately after receiving the ambiguous information and then later asking children to recall the ambiguous information. This would provide stronger evidence that there is an effect of interpretation bias on memory bias.

Moreover, it is possible that the forced choice questions provided may have contaminated children’s memories by having a suggestive effect on their recall in relation to subsequent memory prompts. To put this another way, children were presented with forced choice options that presented a threatening and a benign interpretation, and this information may have had an impact on how they answered the following memory prompts by suggesting that the animal was in fact threatening or benign. A solution for this would be to assess children’s interpretation biases immediately after being presented with ambiguous information, but only with open questions that do not introduce information that may contaminate memories.

Conclusions

Consistent with the previous study by Field and Field (2013), children who interpreted ambiguous information about a novel animal in a negative manner tended to recall the ambiguous information in a negative manner. Likewise, children who tended to make benign interpretations also tended to recall the ambiguous information in a benign manner.

Interpretation bias is predicted to cause a memory bias for ambiguity (Hertel & Brozovich, 2010). As interpretation bias and memory bias were assessed concurrently in Study 1 of this thesis, causal conclusions cannot be made regarding the relationship between these cognitive biases in children. This limitation is addressed in Study 2 through implementing a paradigm involving the experimental manipulation of interpretations for ambiguous vignettes.

Chapter 3: Do Interpretation Biases Cause Memory Biases for Ambiguity?

Cognitive biases are proposed to work in synergy with one another in the development and maintenance of anxiety (Hertel & Brozovich, 2010; Hirsch et al., 2006; Hirsch et al., 2016). People with higher levels of anxiety have interpretation biases and, in turn, their negative interpretations may become part of their memory for ambiguous information and experiences. Very few studies have investigated this proposed relationship in adults, and even fewer have investigated this relationship in children. Yet the relationship between interpretation bias and memory bias is implicated in the risk and maintenance of anxiety (Hertel et al., 2008; Mathews & Mackintosh, 2000).

Study 1 demonstrated a cross-sectional relationship between interpretation bias and memory bias in children. Children who tended to interpret ambiguous information about a novel animal in a negative manner also remembered this ambiguous information in a negative manner. Due to the cross-sectional design of Study 1, however, the direction of this relationship cannot be established. The main aim of Study 2, therefore, was to investigate whether there is evidence that the way in which ambiguity is interpreted subsequently influences later memory for that information. The secondary aim of Study 2 was to investigate the relationship between anxiety and memory bias for ambiguity, due to the significant positive correlation between these variables in Study 1.

The Relationship between Interpretation Bias and Memory Bias

A small number of studies have investigated cross-sectional relationships amongst anxiety, interpretation bias, and memory bias. First, I review research establishing correlations amongst depression, interpretation bias, and memory bias due to the limited research available on this topic. Following this, I review the small number of studies which have investigated this issue with respect to anxious young people and adults. I finish this review with two studies that have found evidence for a causal relationship between interpretation bias and memory bias within an experimental paradigm.

Relationships amongst depression, interpretation bias, and memory bias. The relationship between interpretation bias and memory bias is proposed to function in a similar manner for both depression and anxiety (Hertel & Brozovich, 2010). Specifically, individuals experiencing higher levels of depression may interpret ambiguity negatively and subsequently recall these events in a negative manner (Joormann et al., 2015; Wisco & Nolen-Hoeksema, 2010). What this suggests is that anxiety and depression may have common patterns of cognitive processes that contribute to the risk and maintenance of these disorders (Hertel & Brozovich, 2010).

Significant cross-sectional relationships amongst depression, interpretation bias, and memory bias have been found for adults. To investigate these relationships, adults' interpretation biases were assessed with sentences that could be unscrambled in either a negative or positive manner (Everaert, Tierens, Uzieblo, & Koster, 2013). For instance, 'looks the future bright very dismal', could be unscrambled to make a sentence with a negative meaning or a positive meaning. Interpretation bias was operationalised as a preference for using negative rather than positive cue words to unscramble the ambiguous sentences. Participants were subsequently asked to recall their previously constructed sentences and memory bias was operationalised as recalling a greater number of negative sentences relative to positive sentences. Across two studies employing this methodology, depression was significantly positively correlated with both interpretation bias and memory bias (Everaert, Duyck, & Koster, 2014; Everaert et al., 2013). Moreover, interpretation bias was significantly correlated with memory bias in both studies.

These findings may not generalise to children. Depression is uncommon in children but becomes more prevalent during adolescence and early adulthood (Thapar, Collishaw, Pine, & Thapar, 2012).

Relationships amongst anxiety, interpretation bias, and memory bias. A limited number of studies have investigated the relationships amongst anxiety, interpretation bias, and memory bias. First, I briefly review the findings for young people, and then I review research conducted with adults.

Evidence that interpretation bias is associated with memory bias has been found in cross-sectional research with young people. These studies were reviewed in detail in Chapter 2 and are therefore reviewed in brief here. Children (ages 8-11 years) who interpreted ambiguous information about a novel animal in a negative way also tended to have a greater number of negative memories for the animal (Field & Field, 2013). However, anxiety was not significantly correlated with either interpretation bias or memory bias in Field and Field's (2013) study. Yet, young people (ages 7-13 years) with higher levels of spider anxiety had a greater number of negative memories for ambiguous spider-themed vignettes, and the negative memories appeared to have originated from negative interpretations that these young people had previously made in response to the vignettes (Klein et al., 2014).

A relationship between negative interpretations regarding ambiguous social situations, and subsequent memory bias for these vignettes has been demonstrated in anxious adults (Hertel et al., 2008). Participants were presented with a series of ambiguous vignettes involving social situations, for example: "Your friend asks you to give a speech at her

wedding reception. You prepare some remarks and when the time comes, get to your feet. As you speak, some people in the audience start to laugh” (p. 280). Interpretation bias was assessed by asking participants to provide an ending for each vignette. Memory bias was assessed by asking participants to subsequently recall the content of each vignette and their memories were coded for the presence of intrusions. Participants with higher levels of social anxiety were more likely to provide negative endings for the vignettes, for example: “I’ll wrap up my speech as quickly as I can, as I fear that they are laughing at me” (p. 281). Moreover, participants with higher levels of anxiety were more likely to have intrusions that were negatively valenced, for example: “When the time comes you get up and make your speech. As you start speaking, you realise that people are laughing at you” (p.281). The results suggest that negative interpretations generated by adults with higher levels of social anxiety were being mistakenly introduced into their recall of the vignettes.

Evidence for a causal relationship between interpretation bias and memory bias.

There is also experimental research with adult participants suggesting that negative interpretations may cause ambiguous information to be recalled in a negative manner. A paradigm referred to as *Cognitive Bias Modification of Interpretations* (CBM-I) (Beard, 2011; Lau, 2013) has been used to experimentally manipulate interpretational style to investigate the effect of this manipulation on memory for ambiguous stimuli. The CBM-I paradigm is used to induce either a negative bias or a benign bias by presenting participants with a series of ambiguous vignettes. Participants who are in the negative training condition are reinforced for interpreting the vignettes in a negative manner while participants in the benign condition are reinforced for interpreting the vignettes in a benign manner. Reinforcement is provided via feedback that their interpretation of the vignette is either correct or incorrect. While CBM-I has been shown to change interpretational style over short-term periods of less than 24 hours, longitudinal research on the impact of CBM-I is lacking (Lau, 2013; Yiend, Mackintosh, & Mathews, 2005).

Nonetheless, CBM-I has been shown to influence how adults recall ambiguous vignettes (Joormann et al., 2015; Tran et al., 2011). To assess the impact of CBM-I on memory, adults interpreted a novel set of ambiguous vignettes following the training procedure. The CBM-I manipulation was effective in inducing interpretational styles; participants in the benign training condition were more likely to interpret the novel vignettes in a benign manner and participants in the negative training condition were more likely to interpret the novel vignettes in a negative manner. Following a short filler task, instructions were given to recall the novel ambiguous vignettes. Memories for the novel vignettes

contained intrusions that reflected the valence of the CBM-I training group; participants made more benign intrusions when trained to interpret ambiguity in a benign way, and participants had more negative intrusions when trained to interpret ambiguity in a negative way.

Source monitoring errors are a possible mechanism explaining how interpretation bias may cause memory bias (Hertel et al., 2008). Source monitoring errors are defined as misattributions of the source of a memory, and can occur when inferences (i.e., interpretations) made during an event become confused for what really happened (Johnson, 1997; Johnson & Raye, 1981; Mitchell & Johnson, 2009). Although source monitoring errors occur in individuals with lower levels of anxiety, individuals with higher anxiety are more likely to make negative interpretations when faced with ambiguity. Thus, the *availability* of negative interpretations may mean that ambiguous experiences are more often recalled in a negative manner (Hertel & Brozovich, 2010). In other words, simply having negative interpretations available in mind may be sufficient to cause ambiguous information to be remembered in a negative manner. A failure to differentiate between what actually happened during an ambiguous event and negative interpretations made in response to that event may create a memory bias for recalling ambiguous situations in a negative light. Indeed, Mathews and Mackintosh (2000) propose that for anxious individuals, negative interpretations may “be stored in memory as if they were real events” (p. 603).

In summary, there is evidence that the manner in which ambiguous vignettes are interpreted subsequently influences memory for those vignettes (Joormann et al., 2015; Tran et al., 2011). Anxious individuals are more prone to making negative interpretations in response to ambiguity and may therefore be more likely to remember ambiguous information and events in a negative manner. While there is cross-sectional research in children investigating the relationships between interpretation bias and memory bias, there are no experimental studies that have investigated this relationship. This is necessary to establish whether this relationship may be causal in nature.

Overall Conclusions

Cognitive biases may work in synergy, yet very few studies have investigated the relationships amongst cognitive biases in anxiety (Hertel & Brozovich, 2010; Hirsch et al., 2006). A causal relationship between interpretation bias and memory bias has been proposed as a cognitive mechanism that may maintain or create a vulnerability for anxiety disorders (Hertel et al., 2008; Mathews & Mackintosh, 2000).

A limited number of cross-sectional studies, in both adults and young people, have investigated relationships amongst anxiety, interpretation bias, and memory bias (i.e., Field &

Field, 2013; Klein et al., 2014). Additionally, there is evidence in adults that the interpretation of ambiguous vignettes causally influences subsequent memory for those vignettes (Joormann et al., 2015; Tran et al., 2011). Yet there is no research investigating whether interpretation bias causes memory bias for ambiguity in children. Investigating this relationship in children contributes to an understanding of the cognitive processes that may maintain or create a risk for anxiety. Establishing whether this relationship exists in children may assist in the identification of targets for interventions. Biased cognitive processes associated with anxiety may be less entrenched during childhood, and therefore providing targeted interventions during this developmental window may prevent an escalation of psychological difficulties (Pine, 2007).

The current study. Study 1 showed that children who interpreted ambiguous information about a novel animal in a negative manner, also recalled this information in a negative manner. Children with higher levels of anxiety were also found to recall this information more negatively although they did not make a significantly greater number of negative interpretations. Given the cross-sectional nature of Study 1 and the dearth of research, the overarching aim of the current study was to establish whether there is evidence that the way in which ambiguity is interpreted subsequently influences memory for that information in children. Moreover, the relationship between anxiety and memory bias in children was also investigated due to the limited research on this topic, and because a significant relationship between anxiety and memory bias for ambiguous information was found in Study 1.

To investigate this overarching aim, I presented children with a series of ambiguous vignettes. Each vignette was followed by an interpretation that disambiguated the situation in either a negative or a benign manner. This was a between-subjects design, so that half of the children heard vignettes followed by *negative* interpretations and half of the children heard vignettes followed by *benign* interpretations. As previous cross-sectional studies with children have used a limited range of stimuli (spiders, novel animals) the ambiguous stories that we used involved a range of situations that children may experience in their daily lives. Children were subsequently asked to recall the vignettes. Children's memories of the vignettes were assessed for whether they included intrusions, and whether these intrusions reflected the valence of the interpretations that they had heard. There were two hypotheses: (1) The first hypothesis was that manipulation of interpretations for ambiguous vignettes would influence children's memory of the vignettes. Specifically, children who heard vignettes followed by negative interpretations would have a greater number of negative

memories in their recall of ambiguous vignettes, compared to children who heard vignettes that were followed by benign interpretations.

(2) The second hypothesis was that children with higher levels of anxiety, relative to lower levels, would have a greater number of negative memories in their recall of the ambiguous vignettes. Specifically, I hypothesised that higher levels of anxiety would predict a greater number of negative memories, even when accounting for the interpretation manipulation.

Method

Participants

Participants were 83 children (Girls: $n = 38$, $M = 9.7$ years, $SD = 1.2$; Boys: $n = 43$, $M = 9.9$ years, $SD = 1.1$). Two children were excluded from analyses, leaving a sample size of 81. One child was excluded due to researcher error during the memory interview. One child was excluded due to an invalid anxiety score. Specifically, the child could not demonstrate that they understood the response scale when asked to point to different response options before beginning the questionnaire (e.g., “point to the rectangle that means *a little bit of the time*”). Children were recruited from five primary schools from the Wellington region, New Zealand/Aotearoa. Only children who returned parental consent forms took part in the study. This research was approved by the School of Psychology Human Ethics Committee under delegated authority given by the Victoria University of Wellington Human Ethics Committee.

Measures

Spence Children’s Anxiety Scale (SCAS; Spence, 1998). See Study 1 (pp. 35 & 37) for a detailed description of this assessment and procedure. Internal reliability for the current study was high; $\alpha = .88$.

Materials

Ambiguous vignettes and interpretations. Children heard eight ambiguous vignettes (Appendix F). These vignettes were similar to those used in Study 1 and were based on vignettes used in previous research with children of a similar age (Barrett et al., 1996; Bögels, et al., 2003; Muris, Kindt et al., 2000; Muris et al., 2003). The themes of vignettes were chosen based on fears and worries that are common in children of this age (Cartwright-Hatton, McNichol, & Doubleday, 2006; Gullone, 2000; King, Ollendick, & Gullone, 1991). The vignettes had themes of separation anxiety, physical threats, social anxiety, or school worries (Bögels & Zigterman, 2000; Muris, Merckelbach et al., 2000; Muris et al., 1997). Although each vignette was intended to contain a central theme reflecting one of these areas, there was overlap between the vignettes in their themes and each vignette could pose more than one type of threat. For example, a vignette could pose both a social threat and a physical

threat. Consultation with a primary school teacher was also undertaken in order to refine the vignettes chosen and to ensure the scenarios were situations that children of the age range in the current experiment could realistically experience.

Each vignette involved a fictional character named Jane or John (gender-matched to participant) experiencing the following scenarios: reading a story out loud to classmates, starting at a new school, completing a math test, staying at home alone, encountering a dog on the street, climbing a tree, visiting a crowded shopping centre, and running late for school. All vignettes were administered via a Toshiba laptop using E-Prime software (Schneider, Eschman, & Zuccolotto, 2002) and children heard the vignettes via headphones. For each vignette, a simple visual cue relating to the story appeared on the laptop screen alongside the title of the vignette. For example, a black silhouette of a child (representing Jane/John) was accompanied by a silhouette of a pencil and paper for the vignette 'The Math Test'. When children heard the interpretation for each vignette, a silhouette of Jane/John with a thought bubble appeared on the laptop screen (see Figure 3.1 for example visual stimuli).

Each vignette was disambiguated for the child by either a negative interpretation or a benign interpretation which was framed as the fictional character's interpretation of the scenario. Benign interpretations suggested that the ambiguous situation was safe and that the target character would be able to cope or manage a potential challenge. In contrast, negative interpretations suggested that the ambiguous situation was threatening, something bad might happen, or that the target character would have difficulty coping. Two practice stories were included, one was called 'Going to the Swimming Pool' and the other was called 'At the Beach'. The practice stories allowed the researcher to demonstrate that each story had two parts, the vignette and the interpretation, and provided an opportunity for the researcher to show the child how to respond during the memory interview.

Design

The study adopted a between-group design with interpretation condition as the independent variable and memory for the vignettes as the dependent variable. Children were assigned randomly, balanced across schools, to one of two conditions; (a) *benign* interpretations, or (b) *negative* interpretations. A total of 41 children were in the *benign* interpretations condition (20 girls, $M = 9.4$ years, $SD = 1.3$; 19 boys, $M = 10.0$ years, $SD = 1.2$) and 42 children were in the *negative* interpretations condition (18 girls, $M = 10.0$ years, $SD = 1.2$; 24 boys, $M = 10.3$ years, $SD = 1.1$).

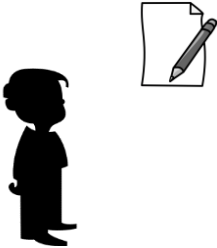

Procedure

Each child was seen individually by the primary researcher during class time. The study took place in a quiet room to minimise distractions. Figure 3.1 shows the order and content of tasks.

First, the child's anxiety was assessed with the assistance of a researcher (see Chapter 2, p. 37, for detail on procedure). Following this, the child was told that they were going to listen to some stories. The child put on the headphones and heard the vignette 'Going to the Swimming Pool', while the accompanying title and images for this vignette were shown on the laptop. This practice vignette was used to explain to the child that each story had two parts and that they should listen carefully to 'part one' of the story (the vignette) and 'part two' of the story (the interpretation).

Following this instruction, the child heard the remaining vignettes. The child was not told that they were going to be asked to recall these vignettes. The program was designed to present stories in a randomised order, but always began with the story 'At the Beach' which was included as a further practice story for the memory interview. A short pause followed part one (the vignette), and then part two (the interpretation) was presented. A short pause also followed part two before the next vignette was presented. After the child had heard the stories, a 3-minute filler task was given, whereby the child had to copy a picture of an animal into an adjacent grid.

Finally, the recall task was given. The child was told that they were going to be asked some questions about part one and part two of each story. First the researcher demonstrated appropriate responses to each question for the practice vignette, 'Going to the Swimming Pool'. Thereafter, the child was given the opportunity to practise recalling information from the vignette 'At the Beach'. The child was first asked a free recall question: "What happened in part one of this story?". Non-directive prompts, such as "mhm", were given to elicit further information. Next, the researcher read aloud the first sentence of the vignette and asked, "What happened next in part one?". If the child appeared to recall part two (aspects of the benign or negative interpretation) when asked about part one they were told the following: "Remember, I only want you to tell me about part one for now, I will ask you about part two in a moment". This reminder was only given for the practice vignette. Following the free recall and prompted memory questions the child was told: "Now I want you tell me what happened in part two". Children's responses were audio recorded via a dictaphone.

Tasks in Order	Description of Task
1) Assessment of Anxiety	Children self-reported their anxiety with the assistance of a researcher
2) Listen to the practice story 'Going to the Swimming Pool'	A practice vignette was presented to children to prepare children for hearing the other vignettes. The researcher highlighted that each vignette had two parts.
3) (a) Listen to the vignette The Math Test 	Each vignette and interpretation was presented auditorily. For example: "The teacher hands out the tests and tells the class to begin solving the math problems. John didn't know that there was going to be a math test today. John looks at the first question and feels surprised." The title, a silhouette of the target character, and a simple visual cue was presented for each vignette.
(b) Listen to the interpretation The Math Test 	An interpretation was provided immediately after each vignette. The title, a silhouette of the target character, and a thought bubble was presented for each interpretation. Children were either in the <i>benign</i> interpretation condition or the <i>negative</i> interpretation condition. For example: <i>Benign</i> = "These questions look really easy, I know how to answer all of them" <i>Negative</i> = "These questions look really hard, I won't know how to answer any of them".

5) Filler Task for 3-minutes	Children completed a filler task involving copying a picture
6) Recall of ‘Going to the Swimming Pool’	The researcher introduced the recall task by showing the child appropriate responses to the practice story ‘Going to the Swimming Pool’.
7) Recall of vignettes and interpretations	Children were asked to recall each vignette via free recall and prompted memory questions. Next, they recalled the interpretation that they had heard.

Figure 3.1. Procedure outline.

Coding for Recall of the Vignettes and Interpretations

Children’s responses for each vignette were transcribed and coded. Each statement was coded as belonging to one of four categories (Appendix G for coding scheme).

Accurate memories reflected correctly recalled information from the story, for example, “Jane went to school and her teacher told her that today they were doing a math test, she looked at the first questions and looked surprised”. This response received three points for accurate memories as there were three accurate statements: (1) “Jane went to school”, (2) “her teacher told her that today they were doing a math test”, (3) “she looked at the first questions and looked surprised”. It was possible to get a total of 58 points for accurate memories across all vignettes.

Negative memories reflected information that had a negative theme and was not part of the original ambiguous vignette, for example: “Jane didn’t know they were going to do a math test and Jane didn’t feel that good because she started getting stomach pains”. This response received two points for negative memories for the following statements: (1) “Jane didn’t feel that good”, (2) “she started getting stomach pains”. One point for accurate memories was also received for the statement: “Jane didn’t know they were going to do a math test”.

Benign memories reflected information that had a benign theme, for example: “She didn’t know there was a test today but when she looked at it, it was pretty easy”. This response received one point for benign memories for the following statement: “it was pretty easy”. One point for accurate memories was also given for: “She didn’t know there was a test today”.

Irrelevant memories reflected information that included additional details that were not in the original vignette or details that were introduced from one of the other stories, for example: “Her teacher put down the piece of paper and told everyone to go sit at their desks”. This response received one point for irrelevant memories as the child stated that the teacher “told everyone to go sit at their desks”; this was a detail that was not part of the original scenario.

The primary researcher coded memories for all of the participants. Reliability was established via coding of a random selection of 30% of cases by an independent coder who was unaware of the central hypotheses. Intraclass correlation coefficients for each memory category were acceptable and ranged from .72 to .81.

Results

Descriptive Statistics and Preliminary Analyses

Descriptive statistics for the key variables in this study are shown in Table 3.1. Descriptive statistics corresponding to the *benign* interpretation condition and the *negative* interpretation condition are reported across all vignettes. It was possible to get a total number of 58 points for accurate memories, and the mean scores suggest that children were able to remember approximately one half of the details from the vignettes. The remaining memory categories did not have a maximum possible number of points. The mean values for anxiety were comparable to previous research (Lagattuta et al., 2012) and indicated that, on average, children endorsed *a little bit of the time* in response to each item.

There was no significant difference in anxiety scores (SCAS total) between participants in the *benign* condition and the *negative* condition, -0.09 , BCa 95% CI $[-8.50, 8.08]$, $t(79) = -0.02$, $p = .98$). There was also no significant difference in age between participants in the *benign* and the *negative* condition, -0.43 , BCa 95% CI $[-10.12, 1.67]$, $t(79) = -1.42$, $p = .16$.

Unfortunately, due to recruitment difficulties the conditions were unable to be evenly matched for gender; there were six fewer girls than boys in the *negative* condition and one fewer boy compared to girls in the *benign* condition. However, preliminary analyses by condition indicated that there were no significant differences in age or anxiety levels between boys and girls within each experimental condition.

Table 3.1

Descriptive Statistics for Key Variables

	Condition			
	Benign Interpretations		Negative Interpretations	
	Mean	Standard Deviation	Mean	Standard Deviation
Age	117.12	15.06	121.41	11.86
Anxiety (SCAS)	38.45	20.05	38.54	15.91
Memories				
Benign	2.95	2.76	0.13	0.34
Negative	1.55	1.82	6.49	4.28
Accurate	27.36	8.21	28.46	8.06
Irrelevant	1.07	1.09	1.00	1.15

Note. Memories: the numbers displayed are the total number of points obtained in recall for each category.

Correlations between the key variables are shown in Table 3.2. In the context of the aims of the experiment, two correlations are noteworthy. First, as expected the interpretation condition was significantly negatively correlated with benign memories and significantly positively correlated with negative memories. These correlations reflect, not surprisingly, a tendency for children in the *benign* condition to report a greater number of benign memories in their recall of the ambiguous vignettes, and children in the *negative* condition to report a greater number of negative memories in recall. Second, child anxiety was also significantly positively correlated with negative memories, indicating that children with higher levels of anxiety reported a greater number of negative memories.

There were three unexpected correlations in Table 3.2 that were identified post hoc. First, anxiety was significantly positively correlated with irrelevant memories. Second, younger children also reported a greater number of benign memories in their recall. Third, girls reported a greater number of benign memories. The third finding was investigated further, as an extreme outlier was identified for benign memories; boxplots revealed that one girl scored above the upper quartile and more than three times the interquartile range for benign memories (Field, 2009). The correlation between gender and benign memories was conducted again, excluding this case. Exclusion of this outlier reduced the correlation

between gender and benign memories and the effect was no longer statistically significant, $r = -.21$, $[-.40, .02]$, $p > .05$.

Accurate memories are not shown in Table 3.2 as they were not relevant the central hypotheses and were not significantly correlated with any of the key variables of interest. However, a significant negative correlation was observed between irrelevant memories and accurate memories, $r = -.44$, $[-.63, -.21]$, $p < .01$. This indicated that children who reported a greater number of irrelevant memories had fewer accurate memories.

Table 3.2

Correlations Between Key Variables

	Gender	Interpretation Condition	Anxiety	Benign Memories	Negative Memories	Irrelevant Memories
Age	.17	.16	.00	-.29**	-.07	-.06
Gender		-.08	-.14	-.24*	-.16	.09
Interpretation Condition			.00	-.58**	.61**	-.09
Anxiety				.16	.23*	.24*
Benign Memories					-.21	.02
Negative Memories						.08

* Significant at $p < .05$. ** Significant at $p < .01$.

Analyses Testing the Hypotheses

Hierarchical multiple regression analyses were conducted to test both the first and second hypotheses that: (1) children who heard vignettes followed by negative interpretations would report a greater number of negative memories compared to children who heard vignettes followed by benign interpretations, (2) higher levels of anxiety would predict a greater number of negative memories even when accounting for the interpretation manipulation. To control for the potential confound of child age and child gender on memories, these variables were entered in the first step of the model. Children's negative memories across all of the

stories served as the dependent variable. Interpretation condition was entered into the second step to test the first hypothesis. Anxiety was entered into the third step to test the second hypothesis. Interpretation condition was a dichotomous variable, with the *benign* interpretation condition dummy-coded as zero, and the *negative* interpretation condition dummy-coded as one.

Bias-corrected and accelerated (BCa) confidence intervals (95%) were constructed for each regression using bootstrapping (1000 samples) as children's anxiety and negative memories exhibited positive skewness. Constructing confidence intervals in this way has been recommended in situations where data do not meet parametric assumptions (Chan & Chan, 2004; Efron & Tibshirani, 1993). These confidence intervals indicate a statistically significant result if they do not include zero (Du Prel, Hommel, Röhrig, & Blettner, 2009).

As shown in Table 3.3, the interpretation condition significantly predicted negative memories in Step 2 and there was a corresponding significant change in R^2 at this step. The positive beta coefficients for interpretation condition indicate that children who heard negative interpretations reported a greater number of negative memories, as expected. Anxiety was a significant predictor of negative memories in Step 3, and there was a small but significant change in R^2 at this step.

In summary, Table 3.3. shows that children in the negative interpretation condition had a greater number of negative memories in their recall of the ambiguous vignettes, compared to children in the benign condition. Moreover, children with higher levels of anxiety also had a greater number of negative memories in their recall of the vignettes and this effect remained even when controlling for the influence of the interpretation condition. These findings support both of the key hypotheses for this study.

Table 3.3

Interpretation Condition and Anxiety Predicting Negative Memories

	<i>b</i>	β	<i>p</i>
Step 1			
Age	-0.01 [-0.06, 0.04]	-0.04	.66
Gender	-1.23 [-2.88, 0.50]	-0.15	.18
Step 2			
Age	-0.05 [-0.09, 0.00]	-0.15	.06
Gender	-0.64 [-1.90, 0.55]	-0.08	.36
Interpretation	5.07 [3.71, 6.68]	0.63	.00
Step 3			
Age	-.05 [-0.09, -0.00]	-0.16	.04
Gender	-.38 [-1.70, 0.99]	-0.05	.58
Interpretation	5.10 [3.77, 6.64]	0.63	.00
Anxiety	0.05 [0.01, 0.09]	0.22	.02

Note. $R^2 = .03$ for Step 1; $\Delta R^2 = .38^{**}$ for Step 2; $\Delta R^2 = .05^{**}$ for Step 3. ** Significant at $p < .01$.

Discussion

The aim of this study was to further investigate the relationship between interpretation bias and memory bias in children ($M = 9.7$ years, $SD = 1.1$). Study 1 demonstrated a significant positive correlation between children's negative interpretations of ambiguous information and negative memories in their recall of that information. This relationship, alongside research conducted with adults, suggests that a tendency to make negative interpretations may cause negative memories for ambiguous information (Hertel & Brozovich, 2010). In other words, interpretation bias may cause memory bias. Experimental research investigating the relationship between interpretation bias and memory bias in children is lacking. Therefore, we investigated the relationship between negative interpretations and memory within an experimental paradigm. This was achieved through

implementing a between-groups experimental proxy for how children interpret and recall ambiguous situations that they might encounter in their daily lives. Children heard a series of ambiguous vignettes followed by either a negative interpretation or a benign interpretation. After a short break, children were asked to recall the content of the vignettes that they heard. Children's recall of the vignettes was coded for whether there were intrusions that reflected the valence of the interpretations that they heard. In addition to this core aim, the relationship between anxiety and memory bias was also investigated.

The first hypothesis, that children who heard ambiguous vignettes followed by negative interpretations would have a greater number of negative memories in their recall, was supported. Negative memories in children's recall of the vignettes were significantly predicted by the interpretation condition. That is, children who heard ambiguous stories followed by negative interpretations had a greater number of negative memories in their story recall overall, compared to children who heard stories that were followed by benign interpretations. This finding supports the prediction, and previous research with adults, that there is a causal relationship between interpretation bias and memory bias, and more specifically, that negative interpretations can lead to ambiguous situations being recalled in a negative manner (Hertel & Brozovich, 2010; Joormann et al., 2015; Tran et al., 2011).

Source monitoring errors have been proposed as the mechanism through which interpretation bias may cause memory bias for negative information (Hertel & Brozovich, 2010; Hertel et al., 2008). Of particular relevance is the proposal that internally generated aspects of events may become confused for external aspects of events. For example, interpretations and thoughts may become attached to one's memory for an event and be recalled as having occurred as part of the actual event (Johnson, 1997; Mitchell & Johnson, 2009). We are all susceptible to making these kinds of errors but the increased availability of negative interpretations, stemming from an interpretation bias for individuals with higher levels of anxiety, may mean that a memory bias for ambiguous situations develops (Hertel & Brozovich, 2010). The results in relation to the first hypothesis suggest that, indeed, the availability of negative interpretations is sufficient to elicit a negative memory bias for ambiguous vignettes, at least in the short term. The content of children's negative memories were often, but not always, very similar in wording to the negative interpretations that were provided. This supports the possibility that negative interpretations were mistakenly introduced into children's vignette recall due to source monitoring errors.

The second hypothesis, that children with higher relative to lower levels of anxiety would report a greater number of negative memories for the ambiguous vignettes, was also

supported. Higher levels of anxiety predicted a greater number of negative memories, even when controlling for negative memories explained by the interpretation condition. This finding is consistent with the proposal that childhood anxiety is characterised by a memory bias (e.g., Muris & Field, 2008; Watts & Weems, 2006). Moreover, this result is consistent with findings from Study 1 which showed that children with higher levels of anxiety had a greater number of negative memories for ambiguous information about a novel animal. A possible explanation for this relationship between anxiety and negative memories in the current study is that children with higher levels of anxiety were generating their own negative interpretations. These negative interpretations may have then become stored in their memory of the vignette and were subsequently erroneously recalled as part of the story.

Unexpectedly, we found that child gender and child age were both negatively correlated with benign memories. This indicated that girls and younger children were more likely to have benign intrusions in their recall of the ambiguous vignettes. Although these relationships were not hypothesised in advance, the correlation between age and benign memories may simply reflect a tendency for older children to be less susceptible to source monitoring errors (Roberts & Blades, 1999). In other words, older children may have been less likely to introduce aspects of benign interpretations (either their own or those provided) into their recall of the vignettes. The significant relationship between gender and benign memories seemed to have been influenced by the presence of an outlier, and removal of this case reduced the correlation between these variables.

A further post hoc finding was that anxiety was significantly positively correlated with irrelevant memories. In other words, children with higher levels of anxiety were more likely to introduce random pieces of information or information from the wrong story into their recall. This finding was not hypothesised but is consistent with the finding in Study 1 of a significant positive correlation between anxiety and irrelevant memories. In response to this finding in Study 1, I speculated that children with higher levels of anxiety may have been more eager to please and were simply reporting 'extra' information. I also speculated that children with greater levels of anxiety may have been engaging in a greater amount of conceptual processing of the ambiguous information, which can lead to errors in recall (Zaragoza et al., 2011). Indeed, there is evidence that young people with higher levels of anxiety may engage in a greater amount of conceptual processing when they encounter potentially threatening stimuli (Daleiden, 1998). This finding requires replication and warrants further research into possible differential memory processes between high and low anxious children.

Limitations and Future Research

The results from the current study should be interpreted with several limitations in mind. The paradigm used in the current study may be viewed as an experimental proxy for the influence of interpretation bias on memory bias. It is important to realise that interpretations were not internally generated, as they ordinarily would be in a child's daily life, but rather were provided to children as an interpretation to an ambiguous vignette. Yet it is plausible that in some circumstances interpretations for ambiguity would be provided to children, for instance by their parents or caregivers. Whether children show a memory bias for ambiguous information when the interpretation is provided by a parent, would make an interesting research question and perhaps provide insight into the intra-familial transmission of anxiety.

Moreover, the ambiguous stories and the interpretation were both presented auditorily, whereas the experience of events can involve multiple modalities of perception. This similarity in the presentation modality of the vignette and the interpretation (i.e., auditorily) may have increased the likelihood of source misattribution, if this is the mechanism responsible for the effect of interpretation on memory. The current study is therefore an approximation for cognitive processes in response to ambiguous situations.

A further limitation regarding the paradigm is the possibility that children did not understand the instructions to recall the story and the interpretation separately. This may have led to some children recalling the interpretation when asked to recall the story. Children did, however, have a practice story and were shown what to do with an exemplar story by the researcher. A related limitation is that it is possible that children introduced the interpretations into their recall of the stories as they were eager to please. Children may have been trying to report everything that they could remember, including the interpretations, to demonstrate all that they knew or because they thought that is what the researcher wanted. Yet children were given corrective feedback for a practice story if they introduced the interpretation at this initial stage. Additionally, it was made explicit that the stories contained two parts and that they were required to recall the two parts separately.

Future research should endeavour to understand whether these findings extend to other age groups, especially in regard to the age at which these cognitive processes begin to occur. Longitudinal research should also be conducted to understand whether the memory effects observed are robust over longer time periods, to understand whether interpretations for ambiguity become part of children's long-term memory.

Conclusions

Evidence was found that providing negative interpretations for ambiguous vignettes, in contrast to benign interpretations, caused children to have a greater number of negative memories in their recall of the vignettes. This finding suggests that the availability of negative interpretations in response to ambiguity may be sufficient to cause a negative memory bias. Moreover, children with higher levels of anxiety also showed a negative memory bias, above that explained by the experimental condition. The possible implication of these findings is that children who tend to make negative interpretations when confronted with ambiguity (i.e., children with anxiety) may then come to remember many experiences in a negative way. Accumulating negative memories for a range of experiences may lead to a worldview that the world is dangerous, thereby perpetuating anxious affect and avoidance behaviours (Hertel et al., 2008; Mathews & Mackintosh, 2000). Further experimental and longitudinal research is needed to investigate what role these cognitive biases might play in the development and maintenance of anxiety in young people.

Chapter 4: Parental Behaviours Implicated in the Development and Maintenance of Anxiety in Young People; A Literature Review

Risk and maintaining factors for anxiety in young people include their individual characteristics and factors within their environments (Lieb et al., 2000; Murray et al., 2009). Vasey and Dadds (2001) predict that such factors interact with each other and can have symbiotic relationships that contribute to the onset and perpetuation of anxiety. While the previous two chapters were concerned with establishing relationships amongst anxiety and cognitive biases, Study 3 changes focus to investigate parental behaviours associated with anxiety in young people. A connection with the previous studies is retained, however, as the relationship between young people's cognitive biases and parental behaviours is investigated. Study 3, therefore, provides a connection between individual level factors and environmental factors that are implicated in the development and maintenance of anxiety.

Higher levels of parental autonomy restriction and lower levels of parental autonomy support have been implicated in the onset and maintenance of anxiety in young people (e.g., Creswell, Murray et al., 2011; Lewis-Morrarty et al., 2012; Rapee, 2001; Vasey & Dadds, 2001). As reviewed in Chapter 1 (see p. 12), Creswell and colleagues (Creswell, Murray et al., 2011) predict that characteristics of children and their parents both influence the degree of autonomy restriction and autonomy support that parents engage in. In this chapter, I review literature that has investigated parental autonomy restriction and autonomy support within the context of anxiety. More precisely, I review research that has investigated the relationships that these parenting behaviours have with specific characteristics of young people and their parents. These findings are relevant to the major aims of Study 3, which are presented in more detail in the next chapter.

As will be highlighted from this review, there are two key gaps in the literature which the final study aims to address: (1) the relationship between parental attributions and parental autonomy restriction and support (2) the relationship between young people's interpretation biases and parental autonomy restriction and support.

The current chapter begins with theoretical frameworks that delineate the potential role of parenting behaviours in the perpetuation and development of anxiety in children. The remainder is devoted to research that has investigated some of the pathways laid out in these theoretical frameworks. As a reminder, the term "children" is used when referring to theoretical predictions in order to maintain consistency with the terminology used in these theories (almost all use the term "children" even when referring to both children and

adolescents). However, the pathways in these theories have been justified with research that also includes adolescent samples.

To identify participant groups in research, the term “children” is used to refer to participants up to the age of 12 years, “adolescents” is used for participants between the ages of 13-18 years, and “young people” includes both. The term “parent-child interaction” is used to describe any kind of interaction that occurs between young people (i.e., up to the age of 18 years) and their parents.

Autonomy Restriction and Autonomy Support: Definitions and Theories

The research and theories presented in this chapter utilise a range of terms when describing parenting behaviours proposed to be involved in the risk for, and maintenance of, anxiety in young people. The term “autonomy restriction” is used throughout to encompass parenting behaviours variously described as overcontrolling, overprotective, overinvolved, or intrusive. The term “autonomy support” is used to encompass parenting behaviours that have been described in the literature as encouraging, autonomy granting, and challenging parenting behaviours.

Parental autonomy restriction is proposed to be characterised by dismissive reactions towards their child’s perspective or feelings, taking charge of conversations or interactions, and explicitly telling their child what they should do, say, or feel (Affrunti & Ginsburg, 2012; Barber, 1996; Barrett, Fox, & Farrell, 2005). Several theorists propose that higher levels of autonomy restriction may convey to children that the world is dangerous, threats are uncontrollable, and that they are not competent to deal with challenges or novel situations on their own (Krohne & Hock, 1991; Mitchell, Broeren, Newall, & Hudson, 2013; Moore, Whaley, & Sigman, 2004). Furthermore, parents who engage in higher levels of autonomy restriction may reduce exposure to situations where children develop coping skills and learn that potential threats are manageable (Hudson & Rapee, 2001; Pereira, Barros, Medonca, & Muris, 2014).

In contrast, autonomy supportive parenting behaviours are defined as the encouragement of independence, acknowledgment of their child’s point of view, and supportive behaviours in the face of challenges (Moore et al., 2004; Rapee, 2001). Several theorists propose that autonomy support helps children to gain a sense of personal mastery over their environment, thereby protecting against the development of anxiety (Chorpita, Brown, & Barlow, 2016; Krohne & Hock, 1991; Rapee, 2001).

There is variation across studies regarding whether autonomy restriction and autonomy support occur on the same continuum or are discrete parenting constructs. The

dimensional conceptualisation posits that parents who engage in higher levels of autonomy restriction will also engage in lower levels of autonomy support; it is not possible to demonstrate both high levels of autonomy restriction and high levels of autonomy support. Non-significant correlations between parental autonomy restriction and autonomy support have provided support for the notion that these parenting behaviours are discrete constructs (Silk, Morris, Kanaya, & Steinberg, 2003). There is also evidence that autonomy restriction and autonomy support differ in their strength of association with anxiety in young people (McLeod et al., 2007; Silk et al., 2003). Despite some variation in how these constructs are conceptualised and labelled, meta-analyses (reviewed later in this chapter) have found that higher levels of parental autonomy restriction and lower levels of autonomy support are both significantly associated with higher levels of anxiety in young people (e.g., McLeod et al., 2007).

In summary, it is theorised that parents who restrict autonomy may implicitly convey that the world is dangerous (Affrunti & Ginsburg, 2012). Autonomy restriction is also predicted to reduce exposure to situations in which children develop competencies to manage challenges. Conversely, autonomy support may help children to develop coping skills (Pereira et al., 2014). The next section introduces theoretical frameworks that delineate relationships between parenting behaviours and anxiety.

Parent-child interactional theories of the development and maintenance of anxiety in young people. Several overlapping theories are relevant for understanding how parental autonomy restriction and support may contribute to the risk and maintenance of anxiety in children (Creswell, Cooper, & Murray, 2010; Creswell, Murray et al., 2011; Ollendick & Benoit, 2012; Rapee, 2001). While there are some minor differences across theories in the extent to which relationships are specified, similar predictions are made regarding the relationships amongst parenting behaviours, characteristics of children, and characteristics of their parents.

A common element of these theories is that higher levels of parental autonomy restriction and lower levels of autonomy support contribute to the development and/or maintenance of cognitive biases in children, which in turn, may maintain or create risk for anxiety. A further common element of these theories is that characteristics of children and their parents both contribute to the extent of parental autonomy restriction and autonomy support. Below, I outline the key relationships from these theories that are relevant to the aims of Study 3. First, I outline how characteristics of children are proposed to influence

parental autonomy restriction and autonomy support. Second, I outline how characteristics of parents are proposed to influence parental autonomy restriction and autonomy support.

The characteristics of young people are predicted to influence parental autonomy restriction. In particular, several theories of anxiety specify that young people who have interpretation biases are more likely to elicit high levels of autonomy restrictive parenting (e.g., Creswell, Cooper, & Murray, 2010; Rapee, 2001). The relationship between interpretation biases and parenting is also predicted to be bidirectional in that autonomy restrictive parenting practices may exacerbate cognitive biases and, in turn, may contribute to the onset of an anxiety disorder (e.g., Ollendick & Benoit; Rapee, 2001). The reason why a child who possesses cognitive biases may elicit autonomy restriction is that they are more likely to become easily distressed, and therefore parents may step in to prevent or reduce this distress. However, this kind of parental reaction may impede the development of coping skills (Rapee, 2001). Similarly, children who already experience an anxiety disorder, and therefore high levels of anxiety, are proposed to elicit higher levels of autonomy restriction and lower levels of autonomy support from their parents (e.g., Creswell, Murray et al., 2011). Again, parents may be more likely to restrict autonomy when they perceive their child is in distress (Rapee, 2001).

Two characteristics of parents that are theorised to influence autonomy restriction and support are parental anxiety and parental attributions. Higher levels of parental anxiety may heighten the risk that parents will be more autonomy restrictive and less autonomy supportive (Creswell, Murray et al., 2011; Rapee, 2001). One of the reasons for this is that parents who are highly anxious may be more likely to hold attributions that their child's environment is threatening, and that their child has an interpretation bias and will not be able to cope. (Creswell, Murray et al., 2011; Ollendick & Benoit, 2012). These attributions may lead to higher levels of autonomy restriction and lower levels of support in an attempt to protect their child from perceived dangers. Parental attributions may also be shaped by their child's characteristics (i.e., interpretation biases and/or anxiety). In other words, parents are more likely to have attributions that their child will interpret ambiguity in a threatening manner and will struggle to cope when in fact their child has responded in this manner on previous occasions. Thus, these attributions lead parents to restrict autonomy to prevent their own and their child's distress (Creswell, Cooper, & Murray, 2010).

To summarise these theorised relationships, higher levels of parental autonomy restriction and lower levels of autonomy support purportedly contribute to the development and/or maintenance of interpretation biases and, in turn, anxiety in children (Ollendick &

Benoit, 2012). Parental autonomy restriction may be more likely to be elicited when children have higher levels of interpretation biases and anxiety. Moreover, autonomy restriction may also be more likely when parents have higher levels of anxiety themselves and when they hold attributions that their child readily perceives threat in their environment (Creswell, Murray et al., 2011; Ollendick & Benoit, 2012).

In the following sections I will review research that has investigated these relationships. I focus on the relationships that parental autonomy restriction and support are proposed to have with the following variables respectively: (1) young people's anxiety, (2) parental anxiety and attributions, (3) young people's interpretation biases. The next section begins with an overview of experimental research, longitudinal research, and meta-analyses that have investigated the relationship between autonomy restrictive and autonomy supportive parenting behaviours, and anxiety in young people.

Research Findings Regarding Autonomy Restriction, Autonomy Support, and Anxiety in Young People

In this section, I begin with a review of experimental and longitudinal studies. Most of the longitudinal research reviewed in this section has been carried out with young children, despite the attainment of autonomy being a key developmental task during adolescence (Berk, 2007). Following a review of experimental and longitudinal studies, I summarise reviews and meta-analyses which synthesise the findings in this area of research.

Longitudinal and experimental research. Experimental and longitudinal studies provide support for the prediction that lower levels of autonomy support and higher levels of autonomy restriction may be involved in the development and maintenance of anxiety in children. Experimental research with young children (ages 4-5 years) has shown that higher levels of parental autonomy restriction caused children to feel less competent and more scared about a challenging activity (Thirlwall & Creswell, 2010). Lower levels of parental autonomy support and higher levels of autonomy restriction have also been shown to longitudinally predict higher levels of anxiety symptoms in preschool children (Hudson & Dodd, 2012; Murray et al., 2014; Majdandžić, Möller, de Vente, Bögels, & van den Boom, 2014). There is also longitudinal evidence suggesting that autonomy restriction maintains anxiety during middle childhood (Borelli, Margolin, & Rasmussen, 2015). Higher levels of anxiety in young children has also been shown to longitudinally predict lower levels of parental autonomy support, suggesting that the relationship between anxiety and autonomy support is bidirectional (Gouze, Hopkins, Bryant, & Levigne, 2016). Some of the issues with these studies is that the parent-child interactions used to assess parenting behaviours, such as

preparing a speech, may lack ecological validity as it is unlikely that these kinds of interactions would occur on a daily basis.

Higher levels of autonomy restriction also longitudinally predict anxiety symptoms in adolescents. Children whose mothers used higher levels of maternal autonomy restriction during middle childhood were found to have higher levels of social anxiety when they were adolescents (at ages 14-17 years; Lewis-Morrarty et al., 2012). Additionally, higher levels of parental autonomy restriction *during* adolescence (ages 14-17 years at baseline) has been shown to predict higher levels of social anxiety in adolescents approximately 20 months later (Lieb et al., 2000). Together these results suggest that parental autonomy restriction may act as a risk and/or maintaining factor for anxiety during adolescence. Autonomy restriction that occurs during adolescence may be important for understanding continuity of anxiety into adulthood as the attainment of autonomy becomes a central developmental task during this time (Berk, 2007). Parental autonomy restriction during adolescence is predicted to hinder the development of competencies required to manage new challenges as young people shift further into the outside world (Barber, Olsen, & Shagle, 1994; Bögels & Phares, 2008).

Overall, longitudinal research has shown that higher levels of parental autonomy restriction and lower levels of parental autonomy support longitudinally predict higher levels of anxiety in young people. These relationships are consistent with the prediction that these parenting behaviours may contribute to the development and maintenance of anxiety in young people. However, relationships pertaining to parental attributions and interpretation biases in young people, laid out in the previously presented theories of anxiety, remain untested (e.g., Creswell, Cooper, & Murray, 2010; Creswell, Murray et al., 2011).

Reviews and meta-analyses. Reviews and meta-analyses show an overall convergence with respect to the relationship between parental autonomy restriction, autonomy support, and anxiety in young people. Research findings suggest higher levels of parental autonomy restriction and lower levels of autonomy support are associated with higher levels of anxiety in young people. Although these reviews and meta-analyses test some of the relationships laid out in the theories presented earlier, none assess parental attributions or young people's interpretation biases.

Reviews have found evidence for a relationship between autonomy restriction and anxiety in children. In a review of 21 studies, higher levels of autonomy restriction were associated with higher levels of anxiety in children (ages 2-11 years; Wood, McLeod, Sigman, Hwang, & Chu, 2003). This relationship was only consistently found for observational studies, which involved a researcher rating parenting behaviours observed

during a parent-child interaction as opposed to collecting participant reports of parenting behaviours via questionnaires. Observational ratings of parenting behaviours may hold greater objectivity and memory biases may also influence ratings of parental behaviours when assessed via questionnaires (Hudson & Rapee, 2001). Autonomy restriction, operationalised as ignoring and dismissive reactions within conversations, was also found to be significantly associated with higher levels of anxiety in young people (ages 8-13 years) in a review of studies involving conversation-based interactions (Percy, Creswell, Garner, O'Brien, & Murray, 2016). Siqueland, Kendall, & Steinberg (1996) suggest that dismissive reactions and a lack of respect for their child's view is one way that autonomy restriction manifests within parent-child interactions.

Several meta-analyses have also found evidence that anxiety in young people is associated with higher levels of parental autonomy restriction and lower levels of autonomy support. In young children (ages 0-5 years) higher levels of autonomy restriction combined with lower levels of autonomy support were significantly associated with higher levels of anxiety in children, but the effect size was small, $r = .06$ [95% CI = .01, .10] (Möller, Nikolić, Majdandžić, & Bögels, 2016). The small effect size between anxiety and parenting in this meta-analysis may have occurred as parent-child interactional styles are not a well-established or entrenched pattern in this early stage of child development. An effect size of medium magnitude (weighted mean $ES = .25$) for the relationship between anxiety and autonomy restriction (operationalised as higher levels of restriction and lower levels of autonomy support) was found in a meta-analysis with an older sample (ages 2-18 years; McLeod et al., 2007). A larger association between parenting behaviours and anxiety was also demonstrated by McLeod et al. (2007) when parenting behaviours were observed by a researcher, as opposed to questionnaires or interviews given to participants.

Only one meta-analysis has also considered the relationship between parental anxiety and autonomy restriction and support (van der Bruggen, Stams, & Bögels, 2008). Overall, there was no association between parental anxiety and autonomy restriction. However, a significant positive relationship occurred between parental anxiety and autonomy restriction for conversation-based tasks (e.g., asking parent-child dyads to discuss a relationship conflict) when compared to unstructured tasks (e.g., free play). As expected, higher levels of anxiety in children (ages 2 months-12 years) was significantly associated with higher levels of autonomy restriction, and this relationship was stronger for older children and when there were more girls in the sample.

In summary, reviews and meta-analyses provide evidence that higher levels of parental autonomy restriction and lower levels of autonomy support are associated with higher levels of anxiety in young people. There are also some tentative findings suggesting that the strength of this association may be influenced by aspects of study design, such as method of assessing parenting and participant characteristics.

Although this research provides an important overview, several relationships from theories of anxiety remain untested. Specifically, the relationships pertaining to parental attributions and young people's cognitive biases. Parents may be more likely to restrict autonomy and less likely support autonomy when they hold attributions that their child will interpret ambiguity in a threatening manner (Creswell, Cooper, & Murray, 2010; Creswell, Murray et al., 2011; Ollendick & Benoit, 2012). Moreover, children who tend to interpret ambiguity in a threatening manner may be more likely to elicit parental autonomy restriction rather than autonomy support. The focus is now turned to research which addresses some of these limitations. First, I will review research that investigates parental attributions regarding their child's interpretations of ambiguous information. Following this, I will review studies that have investigated the relationship between parental autonomy restriction and support, and interpretation biases in young people.

Parental Anxiety and Attributions Regarding Interpretation Biases

Theories of anxiety, presented earlier, predict that parents who have higher levels of anxiety may be more likely to hold attributions that their child will interpret ambiguous situations in a threatening manner (Creswell, Murray et al., 2011; Ollendick & Benoit, 2012). One cross-sectional study has provided evidence for this prediction. Specifically, mothers with higher levels of anxiety were shown to hold a greater number of attributions that their child (ages 7-12 years) would find ambiguous situations threatening. These attributions were assessed by presenting mothers with ambiguous sentences involving potential social and physical threats, and asking the mothers how upset their child would feel and what their child would think in each situation (Orchard, Cooper, & Creswell, 2015).

A causal relationship between parental attributions and parental autonomy restriction has been investigated in one study, through the manipulation of parental expectations regarding their child's ability to cope with a challenge (Creswell, O'Connor, & Brewin, 2008). Each parent was told that they would be helping their child (ages 7-11 years) to complete anagrams, and were given either positive or negative expectations by a researcher regarding their child's ability to cope with the challenge. Parents primed with negative expectations were told the following: "The puzzles we are giving your child are tricky, we

expect your child to struggle with the task which may become upsetting for her/him at some point during the task” (p. 485). Parents primed with positive expectations were told the following: “The puzzles we are giving your child to do are tricky but we expect that she/he will find them fun to do and enjoy the challenge” (p. 485). Compared to parents who were primed with positive expectations, parents primed with negative expectations were more overinvolved during the anagram task, defined as a tendency to disallow their child’s independent completion of the anagrams. While this study demonstrates a relationship between attributions and parental autonomy restriction within a challenging task, an interaction involving the completion of anagrams is unlikely to occur on an everyday basis.

The relationship between parenting behaviours and parental attributions regarding their child’s reactions to ambiguity (i.e., interpretation biases) remains a significant gap in the literature. This relationship is investigated in Study 3.

Parental Autonomy Restriction, Autonomy Support, and Interpretation Biases in Young People

Only two studies have investigated whether parental autonomy restriction and autonomy support have relationships with interpretation biases in young people, and findings are inconsistent.

Children’s (ages 7-10 years) reports of parental autonomy restriction, assessed via questionnaires, were significantly positively correlated with children’s interpretation biases (Affrunti & Ginsburg, 2012). Moreover, children’s interpretation biases mediated the relationship between parental autonomy restriction and children’s anxiety. In other words, higher levels of autonomy restriction predicted higher levels of interpretation biases, which in turn predicted higher levels of anxiety. Although this mediation implies that the direction of effect was from autonomy restriction to interpretation biases, the data was cross-sectional and therefore the direction of effect cannot be known. As previously stated, children with interpretation biases are predicted to elicit autonomy restriction (Creswell, Murray et al., 2011).

In contrast, a relationship between children’s (ages 7-12 years) interpretation biases and parental autonomy restriction was not found in another study where parents completed a questionnaire reporting their own autonomy restriction towards their child (Pereira et al., 2014). A limitation of assessing autonomy restriction via self-report is that it may lack objectivity (Hudson & Rapee, 2001). Indeed, research reviewed earlier in this chapter suggests a larger relationship between autonomy restriction and anxiety in young people

when ratings of autonomy restriction are made by an outside observer (van der Bruggen et al., 2008; Wood et al., 2003).

In summary, there is limited research investigating the relationship between parental autonomy restriction and support, and young people's interpretation biases. This relationship is investigated in Study 3.

Overall Conclusions

Higher levels of parental autonomy restriction and lower levels of autonomy support have been implicated in the development and maintenance of anxiety in young people (e.g., Creswell, Murray et al., 2011; Lieb et al., 2000; Rapee, 2001; Vasey & Dadds, 2001). Attributes of children and their parents are both predicted to determine the extent of autonomy restriction and autonomy support that parents engage in within parent-child interactions (e.g., Creswell, Murray et al., 2011; Ollendick & Benoit, 2012). While a large body of research has shown that greater levels of parental autonomy restriction and lower levels of autonomy support are associated with higher levels of anxiety in young people, there are two key gaps in the literature that are addressed in Study 3.

The first gap is the relationship between parental attributions and parental autonomy restriction and support. Parents who hold attributions that their child will interpret ambiguity in a threatening manner are proposed to be more likely to engage in autonomy restriction and less likely to be autonomy supportive (Creswell, Cooper, & Murray, 2010; Ollendick & Benoit, 2012). While there is evidence that parental attributions influence parental autonomy restriction within an interaction involving a challenging task (Thirlwall & Creswell, 2010), no studies have investigated the relationship between parental attributions and autonomy restriction within interactions that are more likely occur on an everyday basis. In addition, no research has investigated the relationship between parenting behaviours and parental attributions regarding their child's responses to *ambiguous* situations. Yet ambiguous situations occur throughout daily life (Hirsch et al., 2016).

The second gap is that there are limited studies investigating the relationship between autonomy restriction and interpretation biases in young people. Although two studies have investigated the relationship between parental autonomy restriction and interpretation biases (Affrunti & Ginsburg, 2012; Pereira et al., 2014), these studies have relied on questionnaires to assess parenting behaviours. As previously highlighted, self-reports of parenting behaviours may be susceptible to biased reporting (Hudson & Rapee, 2012). There is no research that has investigated this relationship through the observation of a parent-child interaction.

The final study aims to address these gaps in the literature by investigating parental autonomy restriction and autonomy support within an observable mother-adolescent conversation, as these kinds of interactions are likely to occur on an everyday basis. Moreover, an adolescent sample was recruited for Study 3, as few studies with similar research questions have recruited adolescent samples. In the next chapter of this thesis I review research that has investigated anxiety in the context of parent-child conversations and introduce Study 3.

Chapter 5: Parental Autonomy Restriction and Autonomy Support within Parent-Child Conversations

The overarching aim of Study 3 was to investigate parental autonomy restriction and support in the context of parent-adolescent conversations, and their associations with anxiety, parental attributions, and adolescents' interpretation biases. To address this aim, I review research that has investigated parental autonomy restriction and support within parent-child conversations and their associations with anxiety in young people.

While I aimed to investigate parental autonomy restriction in the context of anxiety in young people, there are two key gaps in the literature that are addressed by Study 3: (1) the relationship between parental attributions and parental autonomy restriction and autonomy support, (2) the relationship between young people's interpretation biases and parental autonomy restriction and autonomy support. A limited number of studies have investigated these relationships and, therefore, I highlight this limitation here rather than alongside each study. In addition to these key aims, there are several further gaps in the literature that Study 3 addresses, which I will highlight below.

To aid the integration of study findings and gaps in the literature, Table 5.1 presents a summary of the studies that have investigated parental autonomy restriction and autonomy support within parent-child conversations. From Table 5.1, a pattern emerges that parents of young people with higher levels of anxiety, compared to lower levels of anxiety, are more likely to be autonomy restrictive and less likely to be autonomy supportive within parent-child conversations. From a methodological perspective there are also commonalities, for example, most studies have asked parent-child dyads to discuss emotionally salient events such as a conflict that the participants have had with one another.

Yet gaps are clear. First, most studies have focused on either parental autonomy support *or* parental autonomy restriction, and only two studies have captured both but assessed these parenting behaviours on the same continuum (Moore et al., 2004; Whaley, Pinto, & Sigman, 1999). Previous research has suggested that autonomy support and autonomy restriction should be assessed as separate parenting dimensions (Silk et al., 2003). Thus, in Study 3, autonomy support and autonomy restriction were assessed as separate dimensions.

Second, some studies have assessed parental anxiety while others have not. Higher levels of parental anxiety are predicted to increase parental autonomy restriction and decrease the levels of autonomy support given (Creswell, Murray et al., 2011). Therefore, parental anxiety was also assessed in Study 3.

Third, the mean age of young people in these studies (Table 5.1) is late childhood, and few studies have recruited younger children and adolescent samples. The investigation of autonomy restriction and support during adolescence may be important because the development of autonomy becomes a key task and parental autonomy restriction may have a particularly detrimental effect on wellbeing during this developmental period (Cui, Morris, Criss, Houlberg, & Silk, 2014). Adolescence marks a greater shift into the outside world and autonomy restriction is predicted to impede individuation and prevent adolescents from learning that they are competent to deal with the outside world independently. In turn, higher levels of autonomy restriction and lower levels of autonomy support may increase the risk for, or maintain internalising problems (Barber et al., 1994; Bögels & Phares, 2008). The extent to which parents restrict or encourage autonomy during adolescence may be crucial to understanding the onset and maintenance of anxiety or whether there is continuity of anxiety into adulthood (Petit et al., 2001).

While there is limited research regarding the kinds of interactions that autonomy restriction manifests in across developmental periods, there is evidence that autonomy restriction within behaviour-based interactions (e.g., completing puzzles) decreases from childhood into adolescence (Hudson & Rapee, 2001). Moreover, young children are more physically dependent on their parents, and parents are therefore able to restrict autonomy by physically removing young children from situations perceived as threatening (Möller et al., 2016). During adolescence, Weeks and Pasupathi (2010) predict that ordinary, mundane conversations that adolescents have with their parents are a context in which autonomy development occurs. Because parent-adolescent conversations occur ordinarily, they may provide insight into how autonomy restrictive or autonomy supportive interactions may unfold in daily life during this developmental period.

I review the research in Table 5.1 in greater detail in the remainder of this chapter.

Table 5.1

Summary of Research Investigating Parental Autonomy Restriction and Autonomy Support within Parent-Child Conversations

	Ages & Sample Size	Activity	Conversation Coding	Assess Parent Anxiety?	Results
Brumariu & Kerns (2015)	10-12 <i>M</i> = 11.3 <i>N</i> = 87	Conversation with mothers about a conflict	AR = Maternal Invalidation: misinterpreting, discounting, sarcasm in response to child feelings	No	Maternal invalidation significantly positively correlated with child anxiety

Dadds et al. (1996)	7-14 $M = 10.0$ $N = 100$	Conversations with parents about two ambiguous vignettes	AS = Agreement: percentage of utterances in which parent agreed with young person ideas or opinions	No	Parents of HA young people less likely to agree with young person ideas/opinions
Hudson, Comer, & Kendall (2008)	7-13 $M = 9.6$ $N = 84$	Conversations with parents: a time the young person felt happy, angry, and anxious	AR = Intrusion: controlling behaviour, took over, ignored, restricted independent management	Yes	Mothers of HA showed more intrusion during anxious and angry conversations.
Moore et al. (2004)	7-15 $M = 10.7$ $N = 68$	Conversations with mothers about a conflict, and a time the child felt anxious	AR and AS = Granting of Autonomy: extent to which mother solicited and tolerated differences in opinion, avoided dismissing, encouraged independent thought	Yes	Mothers of HA young people less likely to be autonomy supportive. Maternal anxiety not significantly related to autonomy support
Murray et al. (2014)	4-5 $M = 4.7$ $N = 136$	Mothers narrated picture book about starting school	AS = focus on enjoyable aspects of starting school, drawing on previous positive experiences	Yes	HA mothers less autonomy supportive. Lower levels of autonomy support longitudinally predicted higher child internalising symptoms
Suveg et al. (2008)	8-13 $M = 10.1$ $N = 56$	Conversations with parents: a time the young person felt happy, angry, and anxious	AR = Discouraging: frequency of ignoring young person contribution, changing the topic, belittling the young person	No	No difference between parents of HA and LA young people
Suveg, Zeman, Flannery-Schroeder, & Cassano (2005)	8-12 $M = 10.1$ $N = 52$	Conversations with mothers: a time the child felt sad, angry, and anxious	AR = Discouraging: frequency of ignoring child's contribution, changing the topic, belittling their child	No	Mothers of HA showed greater frequency of discouragement
Whaley et al. (1999)	7-14 $M = 10.3$ $N = 36$	Conversations with mothers about a conflict, and a time the young person felt anxious	AR and AS = Granting of Autonomy: Same as Moore et al., (2004)	Yes	Mothers of HA showed less autonomy granting. HA mothers showed less autonomy granting

Note: For conversation coding: AS = only assessed autonomy support, AR = only assessed autonomy restriction, AR and AS = assessed autonomy support and restriction on one continuum. For results: HA = high anxiety group, LA = low anxiety group.

Autonomy Support in Conversations about Hypothetical Scenarios

Lower levels of parental autonomy support, in the context of conversations about hypothetical scenarios, have been associated with higher levels of anxiety in young people.

Lower levels of maternal autonomy support, within parent-child conversations about starting school, have been shown to longitudinally predict preschool children's (ages 4-5 years) anxiety symptoms (Murray et al., 2014). Autonomy support was operationalised as focussing on enjoyable aspects of starting school and drawing on positive experiences that their child had experienced in the past. Because the conversations were about a salient life event for young children (the transition to school), results may not generalise to older children and to conversations about other kinds of events.

Lower levels of parental autonomy support within conversations about ambiguous situations have also been associated with higher levels of anxiety in young people (ages 7-14 years) (Dadds et al., 1996). Each family was asked to come up with a plan for how the young person would respond to ambiguous vignettes depicting possible social and physical threats. Parents of young people with higher levels of anxiety were less likely to agree with their young person's ideas and opinions during these conversations. Dadds et al. (1996) suggested that fewer agreements demonstrate that parents of anxious young people are less likely to grant autonomy of thought which, in turn, implicitly conveys to young people that they are unable to independently manage ambiguous or challenging situations.

Together these two studies suggest that lower levels of parental autonomy support, within conversations about hypothetical events, are associated with higher levels of anxiety in young people. In the next section, I review research that has investigated autonomy support and autonomy restriction within parent-child conversations about emotion-eliciting events.

Autonomy Support and Autonomy Restriction within Parent-Child Conversations about Emotion-Eliciting Events

Emotionally salient events from the past are frequently discussed within families from early in a child's life (Reese, Bird, & Tripp, 2007; Salmon & Reese, 2016). These kinds of conversations about past events are also referred to as *reminiscing* conversations. Reminiscing conversations about events from the past, as opposed to conversations about present and future events, are proposed to be particularly influential for children's socioemotional development because new perspectives of an event can be evaluated and emotional events can be easier to discuss when intense feelings experienced at the time of an event have subsided (Cleveland & Reese, 2005; Reese et al., 2007; Salmon & Reese, 2016).

Parents of young children have been found to differ in the extent to which they are autonomy supportive or controlling (i.e., autonomy restrictive) during reminiscing conversations. Parental autonomy support is proposed to manifest as encouragement of their child's perspective of the event and validation of their child's contributions to the

conversation. By contrast, a controlling reminiscing style is proposed to be characterised by parental negations and seeking compliance with the parent's perspective of the event (Cleveland & Reese, 2007; Nelson & Fivush, 2004). While this dimension of parental reminiscing style has been employed to look at engagement and the amount of memory information recalled in young children (e.g., Cleveland, Reese, & Grolnick, 2007), in the current chapter the focus is relatively narrow; specifically, I review studies that have investigated the relationship between young people's anxiety and parental autonomy restriction or support within these kinds of conversations.

There is mixed evidence (Table 5.1) that autonomy restriction, manifesting as discouragement within reminiscing conversations, is associated with higher levels of anxiety in young people. Mothers of high-anxious children (ages 8-12 years) showed a significantly greater frequency of discouraging behaviours during conversations about a time when the child felt angry, a time when the child felt sad, and a time when the child felt worried (Suveg et al., 2005). Although there was a statistically significant difference between groups, the frequency of discouraging behaviours was low and the overall difference between mothers of high-anxious ($M = .67$) and low-anxious children ($M = .29$), was small. In a similar study, fathers were also recruited and the conversations took part with young people (ages 8-13 years) and both parents (Suveg et al., 2008). No differences in parental discouragement were found between parents of high and low-anxious young people. It is unclear why there was a contrast in results from the earlier study (i.e., Suveg et al., 2005), yet the results of the earlier study demonstrated that the difference in discouragement between the two groups was small. Conversations also occurred within triads in the latter study which could have altered conversation dynamics.

Maternal autonomy restriction within conversations, operationalised as invalidation of their child's perspective, was significantly correlated with children's anxiety (Brumariu & Kerns, 2015). Mother-child dyads (ages 10-12 years) were asked to have a conversation about a conflict that they had previously had with each other. The authors stated that a conflict conversation was used because power struggles between parents and young people regarding everyday issues, such as chores and privileges, are common. Maternal invalidation within the conversations was significantly positively correlated with children's anxiety.

An assessment of parental attributes, such as parental anxiety and parental attributions, would have strengthened these three studies (Brumariu & Kerns, 2015; Suveg et al., 2005; Suveg et al., 2008) and provided further information on whether parental attributes

were associated with autonomy restriction and support within the interactions. The next three studies I review have investigated parental anxiety in addition to young people's anxiety.

There is mixed evidence that parental anxiety is associated with the extent of parental autonomy support or autonomy restriction within parent-child conversations. Two studies did not find associations between parental anxiety and parental autonomy restriction or support within parent-child conversations (Hudson et al., 2008; Moore et al., 2004). Yet both studies demonstrated that mothers were less likely to be autonomy supportive and more likely to be autonomy restrictive when their child had higher levels of anxiety.

In contrast, maternal anxiety status was associated with lower levels of autonomy support in another study where mother-child dyads (ages 7-14 years) discussed something that caused frequent conflict and something that made the young person feel anxious (Whaley et al., 1999). Autonomy support was operationalised as the extent to which mothers solicited their child's opinions, tolerated differences in opinion, acknowledged their child's views, avoided being dismissive, and encouraged independent thought. While higher scores reflected a greater amount of autonomy support, lower scores reflected the constraining of autonomy. Mothers with higher levels of anxiety demonstrated lower levels of autonomy support. In addition, when both the mother *and* the young person in the dyad met diagnostic criteria for an anxiety disorder, mothers engaged in lower levels of autonomy support; this was in comparison to dyads where only the mothers met diagnostic criteria for anxiety, and dyads where neither the mother nor the child met diagnostic criteria for anxiety.

Overall Conclusions

Characteristics of children and their parents are both predicted to influence parental autonomy restriction and autonomy support (Creswell, Murray et al., 2011; Ollendick & Benoit, 2012; Rapee, 2001; Vasey & Dadds, 2001). The current research on parent-child conversations suggests that when young people have higher levels of anxiety, their parents are more likely to demonstrate autonomy restriction and less likely to demonstrate autonomy support. Yet there are gaps in the literature that exist regarding relationships between these parenting behaviours and attributes of young people and their parents.

While the overarching aim was to investigate parental autonomy restriction and support in the context of anxiety in young people, there were two key gaps in the literature that Study 3 addressed:

(1) The relationship between parental attributions and parental autonomy support and restriction. Attributions that their child will interpret ambiguity in a threatening manner are proposed to be associated with higher levels of parental autonomy restriction and lower levels

of autonomy support (Creswell, Cooper, & Murray., 2010; Creswell, Murray et al., 2011). No research has investigated this relationship.

(2) The relationship between interpretation biases in young people and parental autonomy support and restriction. There is limited research on this relationship and no studies have investigated this relationship employing an observable parent-child interaction. As outlined in Chapter 3, the relationship between these parenting behaviours and interpretation biases is proposed to be reciprocal (Creswell, Murray et al., 2011).

In addition to these two key aims, there are several other gaps in the literature which Study 3 addresses. First, most studies have assessed either parental autonomy support *or* parental autonomy restriction, but not both. Therefore, both autonomy restriction and autonomy support were assessed in Study 3. Second, some studies have assessed parental anxiety while others have not; parental anxiety was assessed in the current study. Third, there is limited research with adolescent samples and the current sample addresses this issue.

The Current Study

Mother-adolescent dyads were asked to discuss a conflict (following previous research e.g., Brumariu & Kerns, 2015) that they had experienced recently. From these transcribed conversations, maternal autonomy support and autonomy restriction were assessed. To investigate relationships between these parenting behaviours and attributes of mothers and adolescents, maternal anxiety and adolescent anxiety levels were also assessed. To address the key gaps in the literature identified above, maternal attributions and adolescents' interpretation biases were also measured by employing ambiguous vignettes. Mothers were asked how their adolescent would interpret these ambiguous vignettes, while adolescents were asked how they themselves would interpret these ambiguous scenarios.

Because there were a range of relationships that could be tested from the current dataset, hypotheses are presented in groups in order to aid interpretation of results. The first set of hypotheses were concerned with relationships that were expected at an individual level for mothers. The second set of hypotheses were concerned with relationships that were expected an individual level for adolescents. The third set of hypotheses were concerned with the relationships at a dyadic level, and models including both adolescent and maternal variables were tested.

Hypotheses group 1: relationships amongst maternal anxiety, maternal attributions, autonomy support, and autonomy restriction. I expected to find that mothers with higher levels of anxiety, compared to lower levels, would hold a greater number of anxious attributions (i.e., expectations that their adolescent would interpret ambiguous

vignettes in a negative manner and suggest anxious/avoidant plans). I also hypothesised that maternal anxiety and maternal anxious attributions would each be significantly positively correlated with autonomy restriction, and significantly negatively correlated with autonomy support.

Hypotheses group 2: relationships amongst adolescent anxiety, interpretation biases, autonomy support, and autonomy restriction. I expected that adolescents with higher levels of anxiety would make a greater number of negative interpretations and anxious/avoidant plans in response to ambiguous vignettes (relative to adolescents with lower anxiety). Additionally, I hypothesised that higher anxiety and higher levels of interpretation biases would each be significantly positively correlated with autonomy restriction and significantly negatively correlated with autonomy support.

Hypotheses group 3: models including both adolescent and maternal characteristics. To aid understanding of the third group of hypotheses, I propose two conceptual models of the relationships between maternal variables, adolescent variables, and the conversational constructs (Figure 5.1 and Figure 5.2). These models are based on predictions that characteristics of young people and their parents both contribute to the extent of parental autonomy restriction and autonomy support (e.g., Creswell, Cooper, & Murray, 2010; Creswell, Murray et al., 2011; Rapee, 2001).

The overall hypothesis was that when entered together into the model, characteristics of adolescents and their mothers would both be significant predictors of maternal autonomy restriction and autonomy support. I tested two models. In terms of the direction of effects, the following relationships were expected:

Model 1: Higher levels of maternal anxiety and higher levels of adolescent anxiety, relative to lower levels, would both significantly predict higher levels of autonomy restriction and lower levels of autonomy support.

Model 2: A greater number of maternal anxious attributions and higher levels of adolescent interpretation biases, would both significantly predict higher levels of autonomy restriction and lower levels of autonomy support.

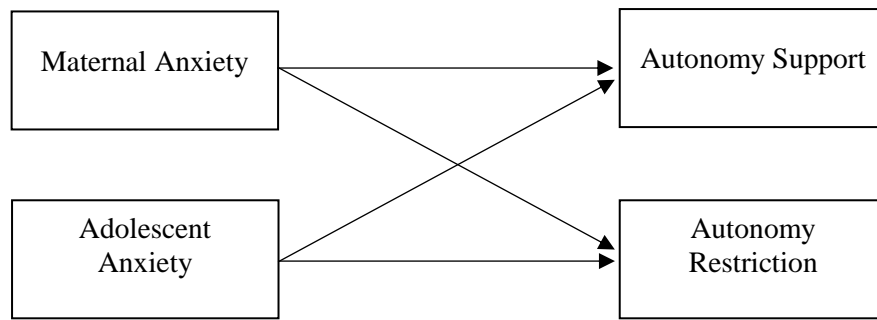


Figure 5.1. Model 1: Conceptual model of maternal anxiety and adolescent anxiety predicting maternal autonomy restriction and autonomy support within the mother-adolescent conversations

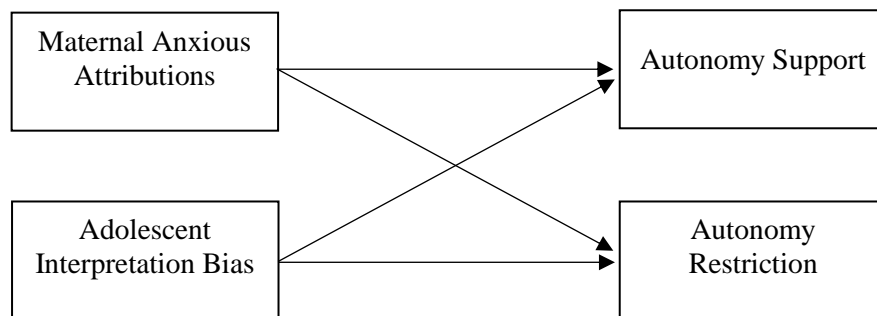


Figure 5.2. Model 2: Conceptual model of maternal anxious attributions and adolescent interpretation biases predicting maternal autonomy restriction and autonomy support within the mother-adolescent conversations

Method

Participants and Recruitment

Participants in the current study were 67 mother-adolescent dyads. Participants were recruited using contact details from a larger pool of participants taking part in a longitudinal study involving the adolescents. While participants completed a range of measures as part of this wider research project, only measures relevant to the current study are reported. Contact was made with 122 mothers via telephone and email, and information about the study was sent via email. If they had agreed to take part, researchers visited the participants in their homes to conduct the study. Upon arrival at participants' homes, consent was gained from mothers and young people over the age of 16 years, while assent was gained from young people under the age of 16 years. Each dyad received a \$50 store voucher for taking part in the study and to thank them for their time.

Three dyads were excluded from analyses either because their recorded conversation was inaudible and could not be transcribed, or they could not decide on an event to discuss when prompted to do so. This left a total of 64 mother-adolescent dyads for analyses (Maternal age: $M = 46.5$ years, $SD = 4.6$; 27 adolescent boys, $M = 15.5$ years, $SD = 0.6$; 37 adolescent girls, $M = 15.2$ years, $SD = 0.8$).

Questionnaire Measures

Maternal anxiety. Maternal anxiety was assessed using the anxiety subscale of the Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995). The anxiety subscale of the 21-item questionnaire includes seven items assessing general levels of anxiety such as, “I felt scared without any good reason”. Responses are given on a 4-point scale and participants are asked to respond to each item regarding how they have felt over the past week using the following options: 0 = did not apply to me at all, 1 = applied to me to some degree, 2 = applied to me to a considerable degree, 3 = applied to me very much, or most of the time. Internal reliability for this study was acceptable, $\alpha = .70$.

Adolescent anxiety. Adolescents completed the Revised Children’s Manifest Anxiety Scale (RCMAS-2; Reynolds & Richmond, 2008). The short form of the RCMAS-2 was utilised, which contains 10 items assessing general anxiety symptoms, such as “I often worry about something bad happening to me”. This tool was designed to be used with young people, ages six to 19 years. Participants respond with “No” (scored zero) or “Yes” (scored one) for each item. Internal reliability in the current study was acceptable, $\alpha = .78$, and consistent with previous research (e.g., Lowe, 2015).

Adolescent depression. Adolescents also completed the Children’s Depression Inventory (CDI-2; Kovacs, 1992) as part of the wider research project. The short form of the CDI-2 was utilised, which contains 12 items and was designed to be used with young people, ages eight to 17 years. Participants are asked to respond to each item regarding how they have felt over the previous two weeks. Each item has three response options, for example “I am sad once in a while” (scored zero), “I am sad many times” (scored one), or “I am sad all the time” (scored two). Internal reliability in the current study was acceptable, $\alpha = .77$.

Tasks

Adolescent interpretation biases and maternal attributions: Ambiguous vignettes paradigm (AVP). Eight ambiguous vignettes (Appendix I), reflecting possible scenarios that adolescents might reasonably experience, were provided by the authors of previous research (Barrett et al., 1996). These scenarios covered ambiguous scenarios that posed potential physical or social threats. While there was some overlap with the vignettes used in Study 1

and Study 2, the situations depicted for the vignettes in Study 3 were events that adolescents might experience rather than children. For example, children in Study 1 and Study 2 were presented with a vignette about reading a story out loud to their classmates, but in the current study the vignette depicted the presentation of a project in front of their class and then noticing that some classmates are laughing. There were also no vignettes in the current study with themes of separation anxiety as this kind of anxiety is uncommon during adolescence (Breton et al., 1999).

To assess adolescents' interpretation biases, adolescents were asked two open-ended questions regarding: (1) what they thought was happening in each scenario, (2) what they would do in each ambiguous situation. Following the first open-ended question, a forced choice question was also given. This was presented as four possible thoughts that they might have in each situation and the adolescent was asked to pick the most likely thought they would have.

To assess maternal attributions, mothers were asked to open-ended questions corresponding to the questions that the adolescent received. Mothers were asked: (1) what they thought their adolescent would think was happening in each scenario, (2) what they thought their adolescent would do. Following the first open-ended question, mothers were also presented with a forced choice question involving four options. The four options were presented as thoughts that their adolescent might have in each scenario and they were to pick the most likely thought their adolescent would have.

For the forced choice questions, two of the options reflected benign interpretations, for example, the classmates are "being silly". Two thoughts reflected negative interpretations, for example, the classmates are "laughing because they think the project is dumb".

Mother-adolescent conversations. Mother-adolescent dyads were asked to choose and discuss a conflict that they had experienced together recently (i.e., within the past two years). For each event, dyads were asked to discuss the conflict as if it had come up in conversation and they were remembering it together (see the 'Procedure' section for specific instructions given to participants). These conversations were recorded and transcribed verbatim. Dyads chose a range of experiences to discuss, including conflicts over chores, house rules, going to parties, curfews, and doing homework.

Procedure

Once both the mother and adolescent had agreed to take part during initial contact, a time was arranged to visit the participants at home. Two researchers were present at each home visit. Upon arrival, both the mother and adolescent were given information sheets about the study and the

appropriate consent or assent forms were filled out. Following this, the participants were asked to discuss the shared conflict. The following prompt was given: “I would like you both to think of a conflict that you experienced together in the last two years. Thinking back over the last two years, try to remember a specific shared experience in which you both felt really negative emotions about a disagreement you had, a time when you might have argued or had a dispute over something. It should be something that stands out in both your memories as a negative scene or moment in your lives”. Once participants agreed upon an event and began their conversation, non-directive prompts were used to elicit further information, for example “what else can you remember about that event?”, until the dyads had remembered all that they could. These conversations were audio-recorded.

After the shared conversations, the mother and the adolescent were taken into separate rooms to complete the remaining assessments. Mothers and adolescents first completed the questionnaires on an Apple Ipad using Qualtrics software. Afterwards, the AVP was introduced with the following prompt, tailored to the adolescent or mother: “I am going to read you a number of hypothetical situations that you/your child might find yourself/themselves in. For each situation, I will first ask you some questions about what you/your child might *think* if you/she/he experienced these situations. Following that, I am going to ask you what you/your child would *do* in that situation”. Each vignette was read aloud by a researcher and responses were also audio-recorded for later transcription (see Appendix H for full instructions and stories).

Coding and Reliability

Attributions and interpretation biases: AVP. Participant responses for the open-ended questions were coded by the primary researcher. Reliability was assessed via the independent coding of a random selection of 30% of cases by a postgraduate psychology student trained by the primary researcher (see Appendix I for the full coding scheme). As previously highlighted, there were two open-ended questions given for each vignette, and these were coded separately.

Adolescent responses to the first question (i.e., what would you think was happening?) were coded as either a benign interpretation (scored zero), or a negative interpretation (scored one). Benign interpretations included responses inferring a benign or non-threatening explanation for the situation, or a suggestion that there might be a good outcome. Negative interpretations included responses that involved harm to self, hostile intent of others, or a bad or catastrophic outcome. A higher score for adolescents reflected a greater number of negative interpretations. An example of a benign interpretation given by an

adolescent for the project scenario was, “they’re just having a laugh between each other”. An example of a negative interpretation given by an adolescent for the project scenario was, “I would get that self-conscious nag that they were laughing at me”. Inter-rater reliability for adolescent responses was good ($ICC = .82$). A total score for negative interpretations was obtained by combining the score for the open-ended and forced choice questions and calculating an average.

Correspondingly, mothers’ responses to the first open-ended question (i.e., what would your adolescent think was happening?) were also coded as either a benign attribution (scored zero) or a negative attribution (scored one). The criteria used for adolescents to determine whether it was a negative or a benign response, was also used for mothers’ attributions. Thus, a higher score for mothers reflected a greater number of negative attributions. An example of a benign attribution given by a mother for this scenario was, “I don’t think she would jump to conclusions that it was about her”. An example of a negative attribution given by a mother for this scenario was, “she would think that they were laughing at her”. Inter-rater reliability for maternal responses ($ICC = .89$) was good. A total score for negative attributions was obtained by combining scores for the open and closed questions.

Adolescents’ responses regarding behavioural plans (i.e., what would you do in this situation?) were coded as either an approach/non-anxious response (scored zero) or an anxious/avoidant response (scored one). Approach/non-anxious responses included any kind of approach behaviours, responses that implied the situation was manageable, or problem solving. Anxious/avoidant responses included escape from the situation, hiding, seeking reassurance, or experiencing negative affect (e.g., embarrassment, fear, worry). An example of an approach/non-anxious response given by an adolescent for the project scenario was, “just talk louder”. An example of an anxious/avoidant response given by an adolescent for this scenario was, “overanalyse it afterwards, with the conclusion it was terrible”. Inter-rater reliability for adolescent responses was good ($ICC = .80$).

Similarly, maternal attributions for the second prompt (i.e., what would your adolescent do?) were coded as either an approach/non-anxious attribution (scored zero) or an anxious/avoidant attribution (scored one). An example of an approach/non-anxious response given by a mother was, “keep going”. An example of an anxious/avoidant response given by a mother was, “expect her to probably flee the room”. Inter-rater reliability for maternal responses ($ICC = .82$) was good.

Mother-adolescent conversations: Autonomy restriction and autonomy support.

The coding scheme was adapted from coding schemes previously used in research with similar methodology and/or aims to the current study (e.g., Moore et al., 2004; Shrock & Woodruff-Borden, 2010; Siqueland et al., 1996; Whaley et al., 1999). Contact was also made with several authors of previously published research regarding details and specific examples of particular constructs relevant to autonomy restriction and autonomy support within conversations (Hammond & Overall, 2015; Oliver, Markland, Hardy, & Petherick, 2008; Suveg et al., 2008). The total number of instances of statements that reflected autonomy restriction and autonomy support were totalled for each dyad. To control for a greater number of opportunities for autonomy restriction and autonomy support to manifest, total occurrences were divided by the total number of conversational turns to create a proportion.

A brief description of the coding scheme developed for this study is given below (see Appendix J for further details of coding scheme). Autonomy restriction was operationalised as the mother demonstrating any of the following kinds of occurrences: invalidating or dismissing the adolescent's perspective or point of view, leading questions, directives, patronising statements, intolerance to differences of opinion. An example of a dismissive response by a mother was:

Adolescent: "I didn't like it, that annoyed me"

Mother: "Yeah but you got out of it pretty quickly"

Leading questions were questions asked by mothers that had an implied answer or imposed a point of view, for example, "do you think it was sensible behaviour?" or "you didn't really care, did you?". Patronising statements were those that used the adolescent's age in the service of an argument to dismiss the adolescent and their perspective, for example, "I don't think you're emotionally mature enough to handle it" and "how old are you? 15?".

Autonomy support was coded separately and was operationalised as the mother asking open questions and validating their adolescent's opinions and perspectives. Open ended questions were simply those that requested further information, such as "what happened" or "how did that feel?". Validations were responses that confirmed and solidified the adolescent's perspective, such as "mhmm" and "yeah" in response to the adolescent's conversational turn.

The primary researcher coded all conversations. Reliability was assessed via the independent coding of 30% of cases by a postgraduate psychology student trained by the

primary researcher. Inter-rater reliability for autonomy restriction ($ICC = .70$) and autonomy support ($ICC = .84$) was good.

Results

Data Reduction and Analysis Strategy

Bias-corrected accelerated confidence (BCa) intervals were constructed around estimates for all analyses using bootstrapping (1000 samples) as several variables exhibited positive skewness: maternal anxiety, child avoidant plans, and the conversational variables. Bootstrapping does not require assumptions about the data that are needed to carry out parametric tests (Chan & Chan, 2004; Efron & Tibshirani, 1993). Moreover, BCa confidence intervals are recommended when data are positively skewed (Chernick & LaBudde, 2011). Confidence intervals for effect sizes that did not include zero and had a corresponding significant p -value less than .05 were considered statistically significant (Field, 2009). Cohen's (1992) conventions to interpret effect sizes for correlation coefficients were also utilised: .10 = small, .30 = moderate, .50 = large.

Maternal attributions regarding what they said their adolescent would *think* and what they thought their adolescent would *do* in response to ambiguous vignettes were highly correlated ($r = .72$, 95% BCa CI [.568, .819], $p < .001$) and were therefore combined into a single score which is hereafter referred to as maternal anxious attributions.

Descriptive Statistics for the Key Variables

Table 5.2 shows the descriptive statistics for the key variables in this study. Maternal total anxiety scores were on average low and in the 'normal' range (Lovibond & Lovibond, 1995). A total anxiety score of 13 was observed for one mother, which differed substantially from the mean and fell into the 'extremely severe' range for anxiety (Lovibond & Lovibond, 1995). More information regarding this outlier is given later in this section. There was a range of scores for maternal anxious attributions and, on average, mothers reported anxious attributions 37% of the time in response to the ambiguous vignettes.

No outliers were observed for adolescent anxiety. Moreover, the mean for adolescent anxiety score was consistent with previous research recruiting adolescents and was in the 'non-problematic' range (Reynolds & Richmond, 2008). The mean for adolescent depression was in the 'average or lower' range (Kovacs, 1992). An extreme outlier was also found for adolescent depression that was in the 'very elevated' range and more information is given about this in the 'Post Hoc Analyses with Adolescent Depression' section.

The descriptive statistics for maternal autonomy restriction and autonomy support show the proportion of instances, relative to conversational turns, that these variables were observed.

Although previous research has shown that the anxiety subscale for the DASS (Lovibond & Lovibond, 1995) exhibits positive skewness (Crawford & Henry, 2003; Henry & Crawford, 2005), there was an outlier in the current sample (see Figure 5.3 for frequency distribution). Pearson correlation coefficients were conducted to compare effect sizes for the relationships between maternal anxiety and the other key variables both with and without the dyad for which the mother had a relatively extreme anxiety score, to investigate whether this anxiety score had a biasing effect. As shown in Table 5.3, removal of this dyad substantially reduced the correlations between maternal anxiety and several other variables. Removal of this dyad did not substantially influence the effect sizes for relationships between other variables and are therefore not displayed.

Table 5.2

Descriptive Statistics for Key Variables

	Max. Possible	Min. Observed	Max. Observed	<i>M</i>	<i>SD</i>
Adolescent Age	-	12.70	16.80	15.30	0.80
Maternal Anxiety (DASS)	21	0	13	1.58	2.08
Maternal Anxious Attributions (AVP)	1	0	.84	.37	.20
Adolescent Anxiety (RCMAS-2)	10	0	9.00	3.65	2.65
Adolescent Depression (CDI-2)	24	0	13	3.63	2.60
Adolescent Negative Interpretations (AVP)	8	0	4.50	2.27	1.10
Adolescent Anxious/Avoidant Plans (AVP)	8	0	5	1.64	1.31
Maternal Autonomy Restriction (Conversations)	-	0	1	0.20	0.24
Maternal Autonomy Support (Conversations)	-	0	1	0.35	0.25

The mother in this dyad also had consistently higher scores on the depression and stress subscales of the DASS that were identified as outliers, providing convergent evidence that this relatively extreme maternal anxiety score was valid and therefore a decision was made to retain this dyad for subsequent analyses. To reduce the potential biasing effect of the maternal anxiety score on effect sizes, however, maternal anxiety scores were dichotomised; values of zero or one ($n = 41$) were dummy-coded as zero (none/a little) and all other scores ($n = 23$) were coded as one (some). The dichotomised values for maternal anxiety were used for all subsequent analyses testing hypotheses.

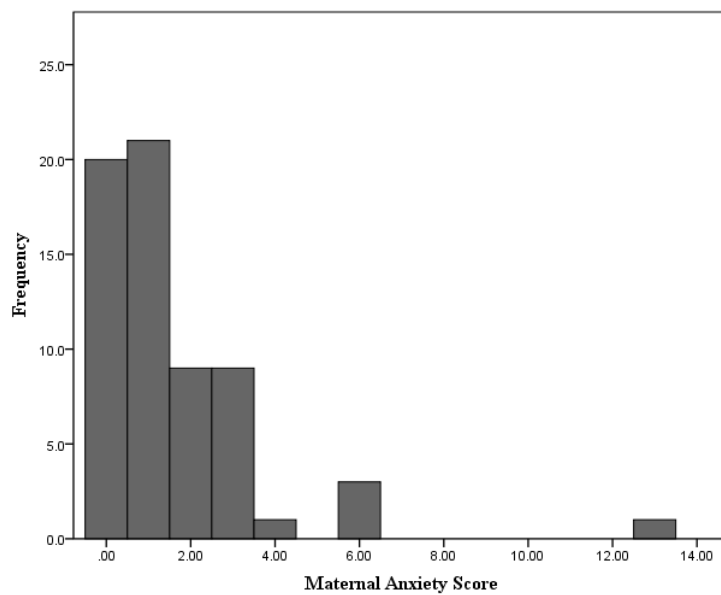


Figure 5.3. Frequency distribution of maternal anxiety scores

Table 5.3

Pearson Correlation Coefficients between Maternal Anxiety and Key Variables when Dyad with Maternal Anxiety Outlier is Retained or Removed

	Age	Gender	Anxious Attributions	Adolescent Anxiety	Negative Interpretations	Anxious/Avoidant Plans	Autonomy Restriction	Autonomy Support
Maternal Anxiety with Outlier	-.03	.04	.22	.23	.23	.30*	.24 [†]	-.08
Maternal Anxiety without Outlier	-.04	-.05	.03	.12	.18	.21	.08	-.05

Note. * $p < .05$. [†] $p \leq .06$. Anxious Attributions = maternal attributions that their adolescent would give negative interpretations and anxious/avoidant plans, assessed via AVP; Negative interpretations = adolescent negative interpretations assessed via AVP; Anxious/avoidant plans = adolescent anxious/avoidant plans assessed via AVP; Autonomy restriction & autonomy support = coded from conversations.

Data Analysis Strategy for Hypotheses Group 1 and Hypotheses Group 2

Pearson correlation coefficients were utilised to test the first two groups of hypotheses. Table 5.4 shows the Pearson correlation coefficients between the key variables. Table 5.5 shows the BCa confidence intervals corresponding to the correlations in Table 5.4.

Hypotheses group 1: relationships amongst maternal anxiety, maternal attributions, autonomy support, and autonomy restriction. I expected to find that mothers with higher levels of anxiety, compared to lower levels, would hold a greater number of anxious attributions, but this was not supported. A non-significant correlation of small to moderate magnitude between these variables is shown in Table 5.4.

I also hypothesised that maternal anxiety and maternal anxious attributions would each be significantly positively correlated with autonomy restriction, and significantly negatively correlated with autonomy support, but these hypotheses were also unsupported. Table 5.4 shows small, non-significant correlations between maternal anxiety and these conversational variables. Maternal anxious attributions had a small non-significant correlation with autonomy support, and a small to moderate sized correlation with autonomy restriction that was of marginal statistical significance.

Hypotheses group 2: relationships amongst adolescent anxiety, interpretation biases, autonomy support, and autonomy restriction. I expected that adolescents with higher levels of anxiety would exhibit interpretation biases to a greater extent, but this was not supported. Table 5.4. shows small, non-significant correlations between adolescent anxiety and negative interpretations, and adolescent anxiety and anxious/avoidant plans.

Additionally, I hypothesised that anxiety and interpretation biases would each be significantly positively correlated with autonomy restriction and significantly negatively correlated with autonomy support. Table 5.4 shows a significant positive correlation, of moderate size, between adolescent anxiety and autonomy restriction, as hypothesised. This indicated that autonomy restriction was more likely to occur when adolescent anxiety levels were higher. Adolescent negative interpretations also had a moderate sized significant positive correlation with autonomy restriction, indicating that autonomy restriction was more likely to occur when adolescents had a tendency to endorse negative interpretations in response to the ambiguous vignettes. The remaining hypotheses were unsupported, as indicated by non-significant correlations.

Post hoc correlations. Three significant relationships were also identified post hoc. First, maternal anxiety was significantly positively correlated with adolescent anxious/avoidant plans. This effect was moderate in size and indicated that mothers with

higher levels of anxiety had adolescents who made a greater number of anxious/avoidant plans in response to the ambiguous vignettes. Second, adolescent anxiety was significantly positively correlated with maternal anxious attributions. This effect was also moderate sized and indicated that mothers had a greater number of anxious attributions when adolescent anxiety levels were also higher. Third, maternal anxious attributions were significantly positively correlated with adolescent gender. This latter relationship was small to moderate in size and indicated that mothers had a greater number of anxious attributions for daughters than for sons.

Table 5.4

Pearson Correlation Coefficients for Key Variables

	Gender	Maternal Anxiety	Anxious Attributions	Adolescent Anxiety	Negative Interpretations	Anxious/Avoidant Plans	Autonomy Restriction	Autonomy Support
Age	-.23	-.01	-.10	.25 [†]	-.07	-.04	.17	.19
Gender		-.15	.26*	.20	-.03	-.19	.23	.06
Maternal Anxiety			.09	-.04	.13	.31*	.13	.07
Anxious Attributions				.31*	-.02	.18	.24 [†]	.11
Adolescent Anxiety					.14	.18	.30*	-.10
Negative Interpretations						.21	.30*	.12
Anxious/Avoidant Plans							.09	-.05
Autonomy Restriction								.09

Note. * $p < .05$. [†] $p \leq .06$. Anxious Attributions = maternal attributions that their adolescent would make negative interpretations and anxious/avoidant plans, assessed via AVP; Negative Interpretations = adolescent negative interpretations assessed via AVP; Anxious/Avoidant plans = adolescent anxious/avoidant plans assessed via AVP; Autonomy Restriction & Autonomy Support = maternal behaviours coded from conversations.

Table 5.5

Bootstrapped and Bias-Corrected (95%) Confidence Intervals for Correlation Coefficients in Table 5.4

	Gender	Maternal Anxiety	Anxious Attributions	Adolescent Anxiety	Negative Interpretations	Anxious/Avoidant Plans	Autonomy Restriction	Autonomy Support
Age	[-.43, .01]	[-.26, .20]	[-.34, .07]	[-.04, .45]	[-.30, .13]	[-.33, .14]	[-.20, .17]	[-.07, .41]
Gender		[-.23, .22]	[.04, .42]	[-.04, .42]	[-.30, .26]	[-.45, .06]	[-.02, .43]	[-.20, .31]
Maternal Anxiety			[-.13, .35]	[-.27, .20]	[-.14, .41]	[.04, .53]	[-.14, .38]	[-.19, .31]
Anxious Attributions				[.03, .53]	[-.27, .31]	[-.15, .43]	[-.07, .50]	[-.19, .32]
Adolescent Anxiety					[-.13, .38]	[-.15, .44]	[.05, .54]	[-.08, .29]
Negative Interpretations						[-.06, .48]	[.01, .56]	[-.12, .36]
Anxious/Avoidant Plans							[-.24, .35]	[-.32, .21]
Autonomy Restriction								[-.16, .32]

Note. * $p < .05$. [†] $p \leq .06$. Anxious Attributions = maternal attributions that their adolescent would make negative interpretations and anxious/avoidant plan, assessed via AVP; Negative Interpretations = adolescent negative interpretations assessed via AVP; Anxious/Avoidant plans = adolescent anxious/avoidant plans assessed via AVP; Autonomy Restriction & Autonomy Support = maternal behaviours coded from conversations.

Hypotheses group 3: testing proposed models including both adolescent and maternal characteristics. Three models were tested for the third group of hypotheses, that adolescent and maternal characteristics would both predict autonomy restriction and autonomy support. Models were tested using IBM AMOS (version 22) software. Bootstrapped and bias-corrected (BC) 95% confidence intervals were constructed (1000 samples). The combinations of variables in each model were as follows:

- (1) Maternal anxiety and adolescent anxiety (Figure 5.4)
- (2) Maternal anxious attributions and adolescent negative interpretations (Figure 5.5)
- (3) Maternal anxious attributions and adolescent anxious/avoidant plans

Because the third model that included maternal anxious attributions and adolescent anxious/avoidant plans did not reveal any statistically significant pathways, this model is not presented. Adolescent gender and age were covaried with the independent variables in each model and were entered as predictors of the conversational constructs. To enhance clarity of the models, pathways for age and gender are not reported as none were found to be statistically significant.

As shown in Figure 5.4, the only significant pathway was from adolescent anxiety to autonomy restriction. This indicated that higher levels of adolescent anxiety predicted higher levels of maternal autonomy restriction. Although the confidence interval for this pathway did not include zero, the lower bound was close to zero.

Figure 5.5 shows that the only significant pathway was from adolescent negative interpretations to autonomy restriction. This indicated that higher levels of adolescent negative interpretations (i.e., interpretation biases) predicted higher levels of maternal autonomy restriction. Again, the lower bound of the confidence interval was close to zero.

In summary, I hypothesised that both maternal and adolescent characteristics would predict maternal autonomy restriction and autonomy support. The evidence from the path analyses shows that adolescent anxiety and adolescent negative interpretations were significant cross-sectional predictors of autonomy restriction. In contrast, maternal anxiety and maternal anxious attributions did not significantly predict any unique variance in autonomy restriction or autonomy support. Some caution should be taken when interpreting these results as the confidence intervals were wide and the lower bounds close to zero. Moreover, as the data are correlational, causality and direction of effect cannot be determined.

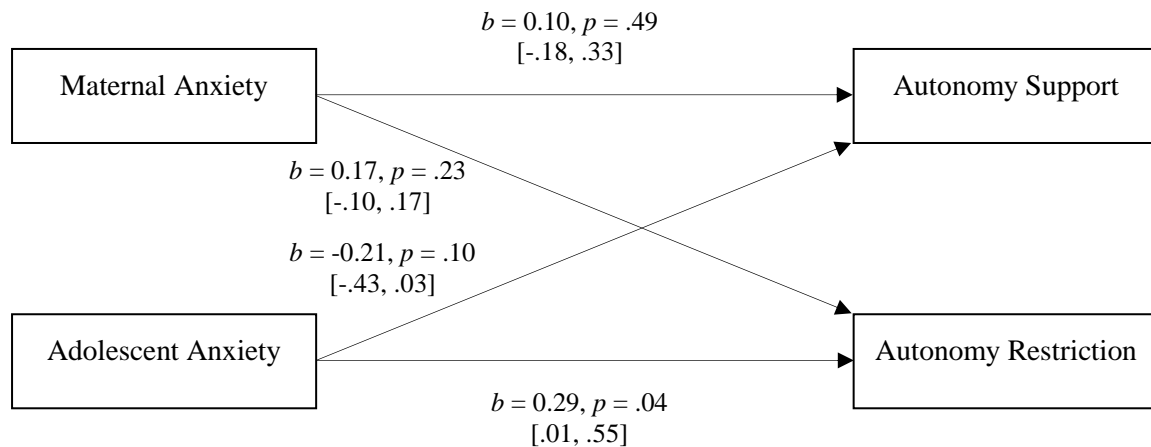


Figure 5.4. Maternal anxiety and adolescent anxiety predicting autonomy support and autonomy restriction. Standardised beta-coefficients are provided for each pathway (b). Bootstrapped BC 95% confidence intervals are shown in brackets.

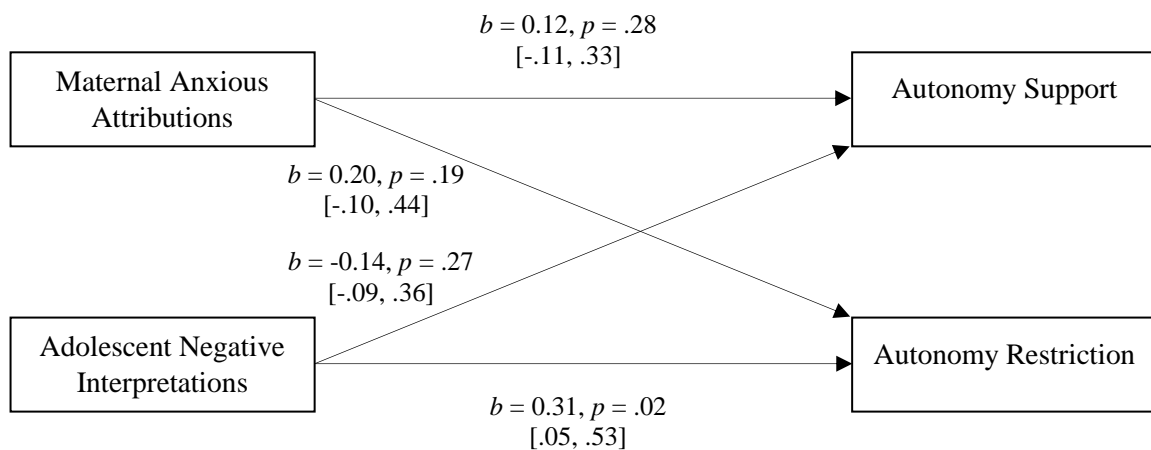


Figure 5.5. Maternal anxious attributions and adolescent negative interpretations predicting autonomy support and autonomy restriction. Standardised beta-coefficients are provided for each pathway (b). Bootstrapped BC 95% confidence intervals are shown in brackets.

Post Hoc Analyses with Adolescent Depression

Depression becomes substantially more prevalent during adolescence (Thapar et al., 2012) and overlaps considerably with anxiety. Autonomy restriction may also be associated with depression during adolescence (Barber et al., 1994; Cui et al., 2014). Therefore, correlations between key variables and adolescents' depression were conducted on a post hoc basis. Depression was investigated separately rather than as an additional variable in the path analyses because anxiety and depression were highly correlated and due to the small sample size relative to the number of variables in those analyses.

An extreme outlier was identified in adolescents' depression scores, therefore correlations were conducted with this outlier (Table 5.6) and without this outlier (Table 5.7)

Table 5.6 (i.e., with the outlier) shows that there were three significant correlations between adolescent depression scores and the key variables in Study 3. First, a large positive correlation was found between adolescent depression and adolescent anxiety. Second, a moderate sized positive correlation was observed between adolescent depression and maternal anxious attributions; this indicated that adolescents with higher levels of depression had mothers who were more likely to believe that they would interpret ambiguity in an anxious manner. Third, a small to moderate sized positive correlation was found for adolescent depression and maternal autonomy restriction; this indicated that adolescents with higher levels of depression had mothers who showed a greater amount of autonomy restriction. Table 5.7 shows that when the outlier was removed, the large positive correlation remained between depression and anxiety, the positive correlation between depression and maternal anxious attributions was reduced but remained statistically significant, and the relationship between depression and autonomy restriction was no longer significant.

Table 5.6

Correlations between Adolescent Depression (with outlier) and Key Variables; Bootstrapped and Bias-Corrected (95%) Confidence Intervals Shown in Parentheses

	Age	Gender	Maternal Anxiety	Anxious Attributions	Adolescent Anxiety	Negative Interpretations	Anxious/Avoidant Plans	Autonomy Restriction	Autonomy Support
Adolescent Depression (CDI)	.16 [-.10, .39]	.21 [-.05, .39]	-.05 [-.28, .19]	.38** [.06, .64]	.63** [.49, .75]	.10 [-.17, .35]	.14 [-.13, .37]	.26* [.01, .50]	-.04 [-.21, .15]

Note. * $p < .05$. ** $p < .01$. Adolescent Depression = depressive symptoms assessed via the Children's Depression Inventory (Kovacs, 1992); Anxious Attributions = maternal attributions that their adolescent would make negative interpretations and anxious/avoidant plans, assessed via AVP; Negative Interpretations = adolescent negative interpretations assessed via AVP; Anxious/Avoidant plans = adolescent anxious/avoidant plans assessed via AVP; Autonomy Restriction & Autonomy Support = maternal behaviours coded from conversations.

Table 5.7

Correlations between Adolescent Depression (without outlier) and Key Variables; Bootstrapped and Bias-Corrected (95%) Confidence Intervals Shown in Parentheses

	Age	Gender	Maternal Anxiety	Anxious Attributions	Adolescent Anxiety	Negative Interpretations	Anxious/Avoidant Plans	Autonomy Restriction	Autonomy Support
Adolescent Depression (CDI)	.18 [-.11, .43]	.18 [-.07, .39]	-.15 [-.33, .05]	.29** [.01, .56]	.62** [.48, .75]	.04 [-.19, .33]	.03 [-.21, .26]	.16 [-.09, .37]	-.02 [-.19, .19]

Note. ** $p < .01$. Adolescent Depression = depressive symptoms assessed via the Children's Depression Inventory (Kovacs, 1992); Anxious Attributions = maternal attributions that their adolescent would make negative interpretations and anxious/avoidant plans, assessed via AVP; Negative Interpretations = adolescent negative interpretations assessed via AVP; Anxious/Avoidant plans = adolescent anxious/avoidant plans assessed via AVP; Autonomy Restriction & Autonomy Support = maternal behaviours coded from conversations.

Discussion

Higher levels of parental autonomy restriction and lower levels of autonomy support are predicted to contribute to the development and maintenance of anxiety in young people (see Chapter 4). Moreover, parent-child interactional theories of anxiety predict that characteristics of children *and* their parents both contribute to the extent of parental autonomy restriction and support that parents engage in (Creswell, Cooper, & Murray, 2010; Creswell, Murray et al., 2011; Rapee, 2001). Study 3 investigated several relationships proposed in these theories while addressing gaps in the literature with respect to these theorised relationships.

In the current study, mother-adolescent dyads were asked to have a conversation about a conflict that they had experienced together. From these conversations, instances of maternal autonomy restriction and autonomy support were coded. Maternal anxiety and adolescent anxiety were assessed separately. In addition, adolescents' interpretation biases were also assessed by asking them to interpret ambiguous vignettes. Maternal attributions regarding their adolescent's responses to these ambiguous scenarios were also measured. Overall, there was evidence that characteristics of adolescents (their anxiety and interpretation biases), rather than maternal characteristics, predicted maternal autonomy restriction within the conversations. Because there were a range of variables assessed, groups of hypotheses were proposed and I will outline each group in turn.

Hypotheses Group 1: Relationships Amongst Maternal Anxiety, Maternal Attributions, Autonomy Support, and Autonomy Restriction

I expected to find that mothers with higher levels of anxiety, compared to lower levels, would hold a greater number of anxious attributions. I also hypothesised maternal anxiety and maternal anxious attributions would each be significantly positively correlated with autonomy restriction, and significantly negatively correlated with autonomy support. None of these hypotheses were supported as non-significant correlations were observed for all of the relationships.

The non-significant correlation between maternal anxiety and maternal anxious attributions is inconsistent with theories of anxiety and previous research findings (e.g., Creswell, Murray et al., 2011; Ollendick & Benoit, 2012). Parents who have higher levels of anxiety are purportedly more likely to hold attributions that their child is vulnerable and that their child will interpret their environment in a threatening manner (Creswell, Murray et al., 2011). Previous research has also shown that parents with higher levels of anxiety were more likely to think that their child would interpret ambiguity in a threatening manner (Orchard,

Cooper, & Creswell, 2015). In the current sample, most mothers endorsed low levels of anxiety and it is possible that there was not enough variation to detect the hypothesised relationship.

The non-significant relationships between maternal anxiety and the conversational constructs (autonomy support and restriction) are also inconsistent with several theories of anxiety which predict that parents with higher levels of anxiety are more likely to restrict their child's autonomy and less likely to support their child's autonomy (e.g., Creswell, Murray et al., 2011; Ollendick & Benoit, 2012; Rapee, 2001). Moreover, previous research has found that higher levels of parental anxiety were significantly associated with higher levels of autonomy restriction and lower levels of autonomy support (e.g., Murray et al., 2014; van der Bruggen et al., 2008; Whaley et al., 1999). Similar to the non-significant result between maternal anxiety and anxious attributions, it is possible that the overall low levels of maternal anxiety and dichotomising these scores reduced the likelihood of finding a significant relationship. Indeed the non-dichotomised maternal anxiety scores showed a marginally significant positive correlation with autonomy restriction as I had predicted, but dichotomising maternal anxiety dramatically reduced this correlation (Table 5.3). Although dichotomising the scores corrected for skewness and reduced the biasing effect of an outlier, this also removed some of the variation in the data.

Finally, the non-significant results for the relationship between maternal anxious attributions and the conversational variables is also inconsistent with the proposal that parents who believe that their child will interpret ambiguity in a threatening manner, are more likely to restrict autonomy and less likely to support autonomy (Creswell, Cooper, & Murray, 2010). While the effect size between maternal anxious attributions and autonomy restriction was small to medium in magnitude, there are no other studies that have investigated this relationship in the context of a mother-adolescent conversation and therefore it is impossible to draw comparisons between the effect size in the current study and previous research.

Hypotheses Group 2: Relationships Amongst Adolescent Anxiety, Interpretation Biases, Autonomy Support, and Autonomy Restriction

The hypothesis that adolescents with higher levels of anxiety would make a greater number of negative interpretations and anxious/avoidant plans in response to ambiguous vignettes was not supported.

I also hypothesised that higher levels of anxiety and higher levels of interpretation biases would each be significantly positively correlated with autonomy restriction and significantly negatively correlated with autonomy support. While there were non-significant

relationships for the hypotheses concerning autonomy support, autonomy restriction showed a different pattern that supported these hypotheses. Specifically, adolescents with higher levels of anxiety had mothers who showed a greater amount of autonomy restriction. Likewise, adolescents who exhibited a greater number of negative interpretations also had mothers who showed a greater amount of autonomy restriction.

The non-significant relationship between adolescent anxiety and interpretation biases contrasts with a large body of research (see Chapter 2), and it is unclear why there was no such effect but below I highlight three possibilities. First, it is plausible that adolescents with higher levels of anxiety were inaccurate in predicting how they would respond to the ambiguous situations. Second, they did not find the ambiguous situations threatening; there may be idiosyncrasies across adolescents regarding the situations that they find threatening and the vignettes employed may not have captured a broad enough range of situations. Potentially supporting these first two possibilities, maternal anxious attributions were significantly positively correlated with adolescent anxiety but not adolescent interpretation biases. This suggests that mothers were predicting how their adolescent would respond to the ambiguous vignettes based on their adolescent's tendency to become anxious and distressed. Yet for some reason (perhaps due to one of the aforementioned possibilities), the adolescents with higher levels of anxiety were not indicating that they would interpret the ambiguous vignettes in a negative manner themselves. Third, a further possibility is that some adolescents may have had interpretation biases but did not have higher levels of anxiety. Some research has shown that anxiety increases in prevalence during adolescence (Canino et al., 2004; Rapee, Schniering, & Hudson, 2009) and it is possible that the onset of anxiety in some adolescents may be preceded by the development of interpretation biases (Ollendick & Benoit, 2012).

The significant relationship between adolescent anxiety and autonomy restriction is consistent with a large body of previous research (see Chapter 4). While higher levels of autonomy restriction are predicted to maintain and create risk for anxiety, the relationship between anxiety and autonomy restriction is proposed to be reciprocal (Creswell, Murray et al., 2011). In other words, young people with higher levels of anxiety are more likely to elicit higher levels of parental autonomy restriction and, in turn, autonomy restriction maintains or exacerbates young people's anxiety. Because the current study is cross-sectional, conclusions about the causal or directional nature of this relationship cannot be made and future research should aim to establish directional relationships within experimental and longitudinal paradigms.

The significant positive correlation between adolescents' negative interpretations (i.e., their interpretation biases) and maternal autonomy restriction, is consistent with a previous study showing a significant positive correlation between autonomy restriction and children's interpretation biases (Affrunti & Ginsburg, 2012). The current finding extends this previous study by demonstrating that a relationship between autonomy restriction and interpretation biases in young people is evident within an observable parent-adolescent interaction that may occur in everyday contexts. Parental autonomy restriction is proposed to contribute to the development and maintenance of interpretation biases by reinforcing avoidance of potential threats and implicitly signalling to young people that the world is threatening (Creswell, Cooper, & Murray, 2010; Creswell, Murray et al., 2011; Ollendick & Benoit, 2012; Vasey & Dadds, 2001). Like anxiety, the relationship between interpretation biases and autonomy restriction may be reciprocal, with parents being more inclined to engage in autonomy restriction when young people tend to interpret their world in a threatening manner. Future research is needed to unpick these relationships. Intervention studies that are designed to reduce autonomy restrictive interactions or the young person's interpretation biases may help to tease out the proposed reciprocal effects.

Hypotheses Group 3: Models Including Both Adolescent and Maternal Characteristics

I hypothesised that maternal and adolescent characteristics would both be significant predictors of maternal autonomy restriction and autonomy support, but this hypothesis was unsupported. Results showed that only adolescent characteristics (anxiety and interpretation biases) predicted autonomy restriction. These results are somewhat unsurprising, given that maternal variables (anxiety and attributions) were not significantly correlated with autonomy restriction.

These results are inconsistent with theories predicting that characteristics of young people and their parents both contribute to the level of autonomy restriction and support that parents engage in (e.g., Creswell, Murray, & Cooper, 2010; Rapee, 2001). Previous research has also shown that lower levels of autonomy support and higher levels of autonomy restriction are more likely to occur when both the parent and their child have higher levels of anxiety, in comparison to dyads where only one member has higher levels of anxiety (Schrock & Woodruff-Borden, 2010; Whaley et al., 1999).

Although our results seem to suggest that adolescent characteristics are more important in determining parental autonomy restriction than parental characteristics, these results should be interpreted cautiously. As already highlighted, many of the mothers reported

low levels of anxiety and it is possible that a sample with greater variation in maternal anxiety would have revealed different relationships.

These results might suggest that autonomy restriction may occur independently of parental anxiety levels and attributions about their adolescent, and may be elicited in response to parenting a young person who becomes easily fearful and distressed. Further research is needed to understand these relationships with samples that include greater variation in maternal anxiety levels.

Relationships Identified Post Hoc

Although not part of the core hypotheses, several significant relationships were identified post hoc.

First, maternal anxious attributions were significantly positively correlated with adolescent anxiety. Parental attributions are proposed to be shaped in response to their child's anxiety levels and their experiences of parenting a child who may become easily distressed or fearful (Creswell, Murray et al., 2011). This relationship, therefore, may reflect an accurate understanding of how their adolescent would think and behave based on many years of observations across a range of situations.

Second, maternal anxiety was also significantly positively correlated with adolescent anxious/avoidant plans. Several theories of anxiety propose that parents who have higher levels of anxiety may be more likely to model anxious and avoidant behaviours when they perceive potential threats and, in turn, young people learn to respond to these situations in similar ways (Creswell, Cooper, & Murray, 2010; Rapee, 2001). This finding, therefore, may reflect possible observational learning processes that have occurred over time.

Third, mothers of daughters, as opposed to sons, also had a greater number of anxious attributions about their adolescents. Although this finding could reflect that girls tend to have higher levels of anxiety and interpretation biases than boys, gender was not significantly associated with either anxiety or interpretation biases (Costello et al., 2003; McLean & Anderson, 2009). It is possible that this relationship reflected gendered expectations that girls will be more fearful than boys.

There were also two significant positive correlations between adolescent depression and key variables, these were: (1) adolescent anxiety, (2) maternal anxious attributions. The relationship between adolescent anxiety and adolescent depression was unsurprising as these psychopathologies are highly comorbid (Thapar et al., 2012). The relationship between adolescent depression and maternal anxious attributions was the same pattern observed for adolescent anxiety. This may suggest that depression and anxiety elicit similar kinds of

parental attributions. This possibility warrants further investigation. The significant positive correlation between adolescent depression and maternal autonomy restriction was no longer significant when an outlier was removed from the sample. Future research should aim to re-examine this latter relationship with samples that include adolescents with higher levels of depression, as the overall levels of depression were low in the current sample and the distribution was positively skewed.

Limitations and Future Research

The findings of this study should be interpreted alongside limitations and caveats. The first is that the conversations were cued by researchers rather than occurring spontaneously. Although we asked participants to discuss an event as if it had come up in conversation, this is not how these conversations would normally be initiated. Moreover, the content of these conversations may have been influenced by the presence of researchers. Giving participants audio recorders to take home and record these conversations in their own time may reduce any influence the presence of researchers might have.

As has been previously highlighted, most mothers reported low levels of anxiety. This may have been the result of a self-selection bias. Mothers with high levels of anxiety may not have wanted to take part for several reasons (e.g., they may have been too stressed or they experience social anxiety). Future research should endeavour to include participants with a greater range of anxiety scores, potentially by recruitment through clinics.

Because we only recruited mothers, our results may not generalise to fathers. Indeed, differences may exist between mothers and fathers in how they discuss events with their children (Bögels & Phares, 2008; Suveg et al., 2008). Although attempts were made to recruit fathers, it became logistically difficult. Recruiting a sufficient number of mothers and fathers will enable comparisons to be made regarding conversations and associations with interpretation biases and anxiety in young people.

It is also highly likely there are other variables that explain anxiety and interpretation biases, in addition to the variables that we assessed. For example, genetic vulnerability, parental modelling, explicitly threatening information, and threatening events (Ollendick & Benoit, 2012; Rapee, 2001). Future research should aim to assess and compare a range of variables to understand the relative contribution that each of these variables make.

A final limitation is that the effect sizes were small to moderate in size, and the lower bounds of confidence intervals for many of these effects were close to zero. Replication of the current findings are therefore warranted. Although there are some practical barriers to data collection with these kinds of samples (e.g., expenses, resources, time constraints),

future studies should aim to investigate whether the current results are replicated with larger sample sizes and greater variability in the anxiety status of parents.

Conclusions

Higher levels of maternal autonomy restriction, within mother-adolescent conversations, was significantly associated with higher levels of adolescent anxiety and higher levels of adolescent interpretation biases. These results may suggest that mothers are more inclined to restrict autonomy when their adolescent becomes easily distressed and fearful. Interactions characterised by high levels of autonomy restriction may become an ingrained pattern over time, inadvertently contributing to the development and maintenance of anxiety in young people (Creswell, Murray et al., 2011; Rapee, 2001). Further research is needed to unpick these possible bidirectional relationships and to understand the role of parental characteristics in this context.

Chapter 6: General Discussion

A range of factors have been implicated in the development and maintenance of anxiety in young people. These factors occur both within the individual and within the environment, and are likely to have dynamic and reciprocal relationships with one another (Lieb et al., 2000; Murray et al., 2009; Vasey & Dadds, 2001). Cognitive biases are one such factor that occur at an individual level. Cognitive biases are also predicted to function in synergy and therefore I investigated the relationships amongst cognitive biases and anxiety in Study 1 and Study 2. Moreover, cognitive biases are predicted to have associations with parental autonomy restriction and support. In Study 3 I investigated parental autonomy restriction and support, and their associations with anxiety, adolescents' interpretation biases, and parental attributions (Creswell, Cooper, & Murray, 2010). Study 3, therefore, provided a bridge between individual level cognitive mechanisms and possible environmental contexts that may contribute to the risk and maintenance of anxiety in young people. In the following sections, I integrate the findings of the current thesis with theory and previous research, consider the strengths and limitations of my programme of research, and future directions.

Study 1 and Study 2: Relationships Amongst Anxiety, Interpretation Biases, and Memory Biases in Children

Across a range of studies, anxiety in young people has been associated with a tendency to interpret ambiguity in a negative manner (e.g., Lau et al., 2012). Furthermore, interpretation biases are predicted to maintain and create a vulnerability for developing anxiety disorders via the potential impact of negatively biased interpretations on memory (Hertel & Brozovich, 2010; Mathews & Mackintosh, 2000). An understanding of the relationship between interpretation bias and memory may be crucial for our understanding of the cognitive mechanisms that may underpin anxiety disorders. Despite these predictions, very few studies have investigated the relationships amongst cognitive biases, especially in children.

In Study 1, children ($M = 10.1$ years) were asked to interpret ambiguous information about a novel animal and reported their memories of this ambiguous information. Consistent with hypotheses, children who made a greater number of negative interpretations also reported a greater number of negative memories when asked to recall the ambiguous information. In other words, interpretation bias was positively correlated with a negative memory bias for ambiguous information. Although there was mixed evidence that anxiety was associated with interpretation bias, anxiety was significantly associated with memory bias. In other words, children with higher levels of anxiety reported a greater number of

negative memories for the ambiguous information. The cross-sectional design of Study 1 did not allow for causal conclusions to be drawn regarding the relationship between interpretation bias and memory bias. This limitation was addressed by the experimental design adopted in Study 2.

In Study 2, children ($M = 9.7$ years) heard a series of ambiguous vignettes and were provided with interpretations that disambiguated each vignette in either a negative or a benign manner. The design of this study was between-groups; children were either in the *benign* interpretations condition, or the *negative* interpretations condition. Children's recall of the vignettes was the outcome variable of interest, and specifically whether children reported negative memories in their recollection of the ambiguous stories as a result of the interpretations presented to them. In support of the main hypothesis, children who heard vignettes followed by negative interpretations, as opposed to benign interpretations, reported a greater number of negative memories in their recall of the vignettes. In addition to the main aim of Study 1, the relationship between anxiety and memory bias for ambiguous vignettes was also investigated. Consistent with the second hypothesis, higher levels of anxiety predicted a greater number of negative memories for the vignettes. In other words, children with higher levels of anxiety demonstrated a negative memory bias for the ambiguous vignettes that was over and above that explained by the experimental condition. This latter finding potentially indicated that children with higher levels of anxiety were generating their own negative interpretations, which then became part of their memory for the ambiguous vignettes.

Results of Study 1 and Study 2 in the context of theory and previous research.

The results of Study 1 and Study 2 show consistencies with other research conducted with young people and adults that has demonstrated a relationship between negative interpretations and negative memories for ambiguous information (Field & Field, 2013; Hertel et al., 2008; Klein et al., 2014). The results are also consistent with the proposal that the availability of negative interpretations subsequently causes ambiguous information and experiences to be recalled in a negative manner (e.g., Hertel & Brozovich, 2010; Hertel et al., 2008; Joormann et al., 2015; Tran et al., 2011).

Anxiety is predicted to be maintained through synergistic relationships amongst cognitive biases (Hirsch et al., 2006). While the results of Study 1 and Study 2 support the prediction that interpretation bias may play a causal role in creating negative memories for ambiguity, the findings do not provide evidence that the relationship between these cognitive

biases maintain and create risk for anxiety in children. To provide this kind of evidence, further longitudinal and experimental studies should be conducted.

Negative memory biases for ambiguity, created by interpretation biases, are proposed to maintain anxiety through the perpetuation of avoidance behaviours and further negative interpretations (Hertel et al., 2008). As highlighted in Chapter 3 (p. 68), a next step from the research conducted in this thesis would be to understand whether negative memories for ambiguity are robust over a longer period (i.e., a longitudinal study) and become part of children's long-term memory for ambiguous events. If this is established, then research could be conducted to determine if these memories influence avoidance behaviours or perpetuate interpretation biases for similar ambiguous situations.

One of the goals of interventions for anxiety is to identify and modify cognitive processes that maintain anxiety. Regarding the possible clinical utility of these findings, consistent evidence was found that anxiety was significantly associated with memory bias for ambiguity. This evidence for a relationship between anxiety and memory bias in children provides a stepping stone for future research to be carried out on the potential causal or maintaining role of memory bias in anxiety. In turn, memory biases may prove to be a useful target within anxiety interventions. Indeed, there is already some evidence that re-framing children's distorted memories for medical procedures may help to alleviate future distress (Chen et al. 1999), but research is needed to understand the impact on anxiety following the manipulation of memories for ambiguity. Cognitive biases may be more malleable during childhood and providing early interventions may be beneficial for preventing an escalation of difficulties (Pine, 2007).

Study 3: Anxiety and Interpretation Biases in the Context of Mother-Adolescent Conversations

In Study 3, maternal autonomy restriction and support, and the associations that these parental behaviours had with anxiety, adolescents' interpretation biases, and maternal attributions, were investigated within the context of mother-adolescent ($M = 15.3$ years) conversations. Specifically, 64 mothers-adolescent dyads discussed a recent conflict that they had experienced. From these conversations, maternal autonomy restriction and autonomy support were assessed.

The results from Study 3 revealed that, as hypothesised, adolescents with higher levels of anxiety had mothers who demonstrated a greater amount of autonomy restriction within the conversations. The relationship between anxiety and autonomy restriction is consistent with a large body of previous research and with theoretical proposals that young

people who experience higher levels of anxiety elicit a greater amount of autonomy restriction from parents (see Chapter 4). Moreover, higher levels of parental autonomy restriction are proposed to maintain anxiety in young people by preventing exposure to feared situations and implicitly conveying that the world is dangerous (Krohne & Hock, 1991; Mitchell et al., 2013). In other words, the relationship between anxiety and autonomy restriction is predicted to be reciprocal (Creswell, Murray et al., 2011).

The second key finding from Study 3 was that, as hypothesised, adolescents who were more likely to interpret ambiguous vignettes in a negative manner also had mothers who demonstrated a greater level of autonomy restriction within the conversations. A limited number of studies have investigated the relationship between autonomy restriction and interpretation biases in young people, and this finding from Study 3 is consistent with one previous study (Affrunti & Ginsburg, 2012). Study 3 extended this research by assessing parental autonomy restriction from an observable interaction, as opposed to a questionnaire, and by recruiting an adolescent sample.

Similar to predictions for anxiety, higher levels of parental autonomy restriction purportedly contribute to the development and maintenance of interpretation biases by signalling that the world is threatening. Additionally, this relationship is proposed to be reciprocal, as young people who have interpretation biases may be more likely to elicit autonomy restriction (Creswell, Cooper, & Murray, 2010). Although the cross-sectional association between autonomy restriction and interpretation biases is consistent with the prediction that there is an association between these variables, further research is needed to understand the nature of this relationship. Experimental studies manipulating either autonomy restriction or young people's interpretation biases, and assessing the impact that this has on the other variable, would help to establish causal and maintaining roles, and whether this relationship is bidirectional.

Parental autonomy restriction is also proposed to support the development of anxiety in young people via the development of interpretation biases (Ollendick & Benoit, 2012). Adolescents' anxiety and interpretation biases were both independently associated with autonomy restriction, but were not significantly associated with each other. These relationships painted a confusing picture, but several possibilities for the lack of association between anxiety and interpretation biases were given in Chapter 5 (p. 108). Longitudinal research would help to unpack the relationships between anxiety, interpretation biases, and parenting behaviours, and whether autonomy restriction creates a risk for interpretation bias that in turn creates a risk for anxiety.

Maternal characteristics (i.e., their own anxiety levels and attributions about their adolescent) were not significantly associated with autonomy restriction or autonomy support in Study 3, despite theoretical predictions to the contrary (e.g., Creswell, Murray et al., 2011; Ollendick & Benoit, 2012; Rapee, 2001). The results are, however, consistent with the prediction that autonomy restrictive parenting behaviours are elicited by attributes of young people (e.g., higher anxiety, interpretation bias) (Creswell, Cooper, & Murray, 2010; Creswell, Murray et al., 2011). Although the correlational findings cannot demonstrate causal or maintaining roles, an implication of these results may be that clinicians should be aware that parental behaviours could maintain anxiety and cognitive biases, regardless of parents' own levels of anxiety or the attributions that they hold. Replication and extension of these findings with research to establish causal relationships should be carried out to better understand whether this latter implication is supported. Additionally, and as discussed in Chapter 5 (see pp. 95-97), there was little variability in maternal anxiety scores and replication with a more diverse sample is also needed.

Overall, the findings from Study 3 make a unique contribution to the literature by demonstrating that adolescents' interpretation biases are significantly positively correlated with parental autonomy restriction within conversations. Future research should be designed to answer questions regarding causality and maintenance, as interpretation biases and parental behaviours may be effective targets for intervention.

The Relationship between Anxiety and Interpretation Bias; Inconsistent Evidence

While the relationship between anxiety and interpretation biases in young people is well-established in research (see Table 1.1), there was inconsistent evidence for these relationships across Study 1 and Study 3.

In Study 1, children with higher levels of anxiety did not give a greater number of negative interpretations when asked to say what would happen next in response to ambiguous vignettes, but did give a greater number of anxious/avoidant responses when asked to say what they would do in each situation. One possibility for this result is that anxious/avoidant plans in response to ambiguity may be a unique feature of anxiety disorders, while young people with externalising problems may also endorse negative interpretations in response to ambiguity (e.g., Barrett et al., 1996). Future studies should endeavour to include multiple measures of psychopathology to investigate this possibility.

In Study 3, however, there were no significant relationships between adolescent anxiety and adolescent interpretation biases. In other words, adolescents with higher levels of anxiety did not give a greater number of negative interpretations, nor did they give a greater

number of anxious/avoidant plans. While a fuller discussion of the reasons for these results are given in Chapter 5 (p. 108), I briefly outline the three possibilities that I suggested. First, adolescents with higher levels of anxiety may have been inaccurate in predicting how they would respond in each ambiguous situation. Second, the adolescents may not have found the ambiguous situations threatening (i.e., the kinds of situations that elicit interpretation biases are idiosyncratic). Potentially supporting these two possibilities was the fact that maternal anxious attributions were associated with higher levels of adolescent anxiety, but were not associated with higher levels of adolescent interpretation biases. This suggested that mothers were predicting how their adolescent would respond to ambiguity based on their adolescents' anxiety levels and perhaps based on how their adolescent had responded to previous similar situations (i.e., they became anxious/distressed). Yet the adolescents with higher levels of anxiety did not report higher levels of interpretation biases themselves. Third, some adolescents may have had interpretation biases but did not have higher levels of anxiety, and it is possible that the presence of interpretation biases in these adolescents represented a risk factor for the development of anxiety. Future research could also be conducted to understand if interpretation biases become more common during adolescence, and whether this explains the increased prevalence of anxiety disorders during this developmental period (e.g., Canino et al., 2004; Ford et al., 2003).

Final Conclusions

Anxiety is a common form of psychopathology in young people, and an understanding of risk and maintaining factors assists in the development of effective interventions that seek to prevent and treat anxiety disorders. The research conducted in this thesis contributes to the literature on potential risk and maintaining factors by investigating cognitive factors and that may underpin anxiety, and examining the relationships between these cognitive factors and parenting behaviours implicated in anxiety in young people. Specifically, the research in this thesis has provided evidence that negative interpretations for ambiguous information may cause children to recall this information in a negative manner. This supports the theoretical prediction that there are synergistic relationships amongst cognitive biases (Hirsch et al., 2006). The findings also provide evidence that childhood anxiety is characterised by memory biases for ambiguous information. Moreover, this thesis demonstrated a relationship between adolescents' cognitive biases and parenting behaviours. Specifically, adolescents who were more likely to interpret ambiguous vignettes in a negative manner also had mothers who demonstrated a greater level of autonomy restriction within mother-adolescent conversations. This latter finding provides evidence for the theoretical

prediction that there are relationships amongst individual level cognitive factors and contextual/environmental factors that may maintain or exacerbate anxiety in young people (Creswell, Murray et al., 2011; Vasey & Dadds, 2001).

References

- Achenbach, T. M., & Edelbrock, C. S. (1991). *Manual for the child behavior checklist and profile*. Burlington: University of Vermont.
- Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA preschool forms and profiles*. Burlington: University of Vermont, Research Center for Children, Youth, & Families.
- Adams, S., Kuebli, J., Boyle, P. A., & Fivush, R. (1995). Gender differences in parent-child conversations about past emotions: A longitudinal investigation. *Sex Roles*, 33(5), 309-323. doi:10.1007/bf01954572
- Affrunti, N. W., & Ginsburg, G. S. (2012). Exploring parental predictors of child anxiety: The mediating role of child interpretation bias. *Child & Youth Care Forum*, 41(6), 517-527. doi:10.1007/s10566-012-9186-6
- Almqvist, F., Puura, K., Kumpulainen, K., Tuompo-Johansson, E., Henttonen, I., Huikko, E., . . . Tamminen, T. (1999). Psychiatric disorders in 8-9-year-old children based on a diagnostic interview with the parents. *European Child & Adolescent Psychiatry*, 8(4), S17-S28. doi:10.1007/pl00010699
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Bados, A., Gómez-Benito, J., & Balaguer, G. (2010). The state-trait anxiety inventory, trait version: Does it really measure anxiety? *Journal of Personality Assessment*, 92(6), 560-567. doi:10.1080/00223891.2010.513295
- Barber, B. K. (1996). Parental psychological control: Revisiting a neglected construct. *Child Development*, 67(6), 3296-3319. doi:10.1111/j.1467-8624.1996.tb01915.x
- Barber, B. K., Olsen, J. E., & Shagle, S. C. (1994). Associations between parental psychological and behavioral control and youth internalized and externalized behaviors. *Child Development*, 65(4), 1120-1136. doi:10.1111/j.1467-8624.1994.tb00807.x
- Barrett, P. M., Fox, T., & Farrell, L. J. (2012). Parent-child interactions with anxious children and with their siblings: An observational study. *Behaviour Change*, 22(4), 220-235. doi:10.1375/bech.22.4.220
- Barrett, P. M., Rapee, R. M., Dadds, M. M., & Ryan, S. M. (1996). Family enhancement of cognitive style in anxious and aggressive children. *Journal of Abnormal Child Psychology*, 24(2), 187-203. doi:10.1007/bf01441484

- Beard, C. (2011). Cognitive bias modification for anxiety: current evidence and future directions. *Expert Review of Neurotherapeutics*, 11(2), 299-311.
doi:10.1586/ern.10.194
- Beck, A. T., & Clark, D. A. (1997). An information processing model of anxiety: Automatic and strategic processes. *Behaviour Research and Therapy*, 35(1), 49-58.
doi:10.1016/S0005-7967(96)00069-1
- Beesdo, K., Knappe, S., & Pine, D. S. (2009). Anxiety and anxiety disorders in children and adolescents: Developmental issues and implications for DSM-V. *Psychiatric Clinics of North America*, 32(3), 483-524. doi:10.1016/j.psc.2009.06.002
- Beidel, D. C., Turner, S. M., & Morris, T. L. (1995). A new inventory to assess childhood social anxiety and phobia: The social phobia and anxiety inventory for children. *Psychological Assessment*, 7(1), 73-79. doi:10.1037/1040-3590.7.1.73
- Bell-Dolan, D. J. (1995). Social cue interpretation of anxious children. *Journal of Clinical Child Psychology*, 24(1), 2-10. doi:10.1207/s15374424jccp2401_1
- Berk, L. E. (2013). *Child development* (9th ed.). US: Pearson Education Inc.
- Bieling, P. J., Antony, M. M., & Swinson, R. P. (1998). The state-trait anxiety inventory, trait version: structure and content re-examined. *Behaviour Research and Therapy*, 36(7), 777-788. doi:10.1016/S0005-7967(98)00023-0
- Bittner, A., Egger, H. L., Erkanli, A., Costello, E. J., Foley, D. L., & Angold, A. (2007). What do childhood anxiety disorders predict? *Journal of Child Psychology and Psychiatry*, 48(12), 1174-1183. doi:10.1111/j.1469-7610.2007.01812.x
- Bögels, S., & Phares, V. (2008). Fathers' role in the etiology, prevention and treatment of child anxiety: A review and new model. *Clinical Psychology Review*, 28(4), 539-558. doi:10.1016/j.cpr.2007.07.011
- Bögels, S. M., Snieder, N., & Kindt, M. (2003). Specificity of dysfunctional thinking in children with symptoms of social anxiety, separation anxiety and generalised anxiety. *Behaviour Change*, 20(3), 160-169. doi:10.1375/bech.20.3.160.24836
- Bögels, S. M., & Zigterman, D. (2000). Dysfunctional cognitions in children with social phobia, separation anxiety disorder, and generalized anxiety disorder. *Journal of Abnormal Child Psychology*, 28(2), 205-211. doi:10.1023/A:1005179032470
- Borelli, J. L., Margolin, G., & Rasmussen, H. F. (2015). Parental overcontrol as a mechanism explaining the longitudinal association between parent and child anxiety. *Journal of Child and Family Studies*, 24(6), 1559-1574. doi:10.1007/s10826-014-9960-1

- Boyer, P., & Bergstrom, B. (2011). Threat-detection in child development: An evolutionary perspective. *Neuroscience & Biobehavioral Reviews*, 35(4), 1034-1041.
doi:10.1016/j.neubiorev.2010.08.010
- Bradley, B. P., & Mogg, K. (1994). Mood and personality in recall of positive and negative information. *Behaviour Research and Therapy*, 32(1), 137-141. doi:10.1016/0005-7967(94)90095-7
- Breton, J. J., Bergeron, L., Valla, J.P., Berthiaume, C., Gaudet, N., Lambert, J., . . . Lépine, S. (1999). Quebec child mental health survey: Prevalence of DSM-III-R mental health disorders. *Journal of Child Psychology and Psychiatry*, 40(3), 375-384.
doi:10.1111/1469-7610.00455
- Brumariu, L. E., & Kerns, K. A. (2015). Mother-child emotion communication and childhood anxiety symptoms. *Cognition and Emotion*, 29(3), 416-431.
doi:10.1080/02699931.2014.917070
- Burt, S. A. (2009). Rethinking environmental contributions to child and adolescent psychopathology: A meta-analysis of shared environmental influences. *Psychological Bulletin*, 135(4), 608-637. doi:10.1037/a0015702
- Canino, G., Shrout, P. E., Rubio-Stipec, M., Bird, H. R., Bravo, M., Ramirez R., ... Martinez-Taboas, A. (2004). The DSM-IV rates of child and adolescent disorders in Puerto Rico: Prevalence, correlates, service use, and the effects of impairment. *Archives of General Psychiatry*, 61(1), 85-93. doi:10.1001/archpsyc.61.1.85
- Caron, C., & Rutter, M. (1991). Comorbidity in child psychopathology: Concepts, issues and research strategies. *Journal of Child Psychology and Psychiatry*, 32(7), 1063-1080.
doi:10.1111/j.1469-7610.1991.tb00350.x
- Cartwright-Hatton, S., McNicol, K., & Doubleday, E. (2006). Anxiety in a neglected population: Prevalence of anxiety disorders in pre-adolescent children. *Clinical Psychology Review*, 26(7). doi:10.1016/j.cpr.2005.12.002
- Castillo, M. D., & Leandro, P. G. (2010). Interpretation bias in anxiety a synthesis of studies with children and adolescents. *Procedia - Social and Behavioral Sciences*, 5, 1105-1111. doi:10.1016/j.sbspro.2010.07.243
- Chan, W., & Chan, D. W. L. (2004). Bootstrap standard error and confidence intervals for the correlation corrected for range restriction: A simulation study. *Psychological Methods*, 9(3), 369-385. doi:10.1037/1082-989X.9.3.369

- Chaplin, T. M., Cole, P. M., & Zahn-Waxler, C. (2005). Parental socialization of emotion expression: Gender differences and relations to child adjustment. *Emotion*, 5(1), 80-88. doi:10.1037/1528-3542.5.1.80
- Chen, E., Zeltzer, L. K., Craske, M. G., & Katz, E. R. (1999). Alteration of memory in the reduction of children's distress during repeated aversive medical procedures. *Journal of Consulting and Clinical Psychology*, 67(4), 481-490. doi:10.1037/0022-006X.67.4.481
- Chernick, M. R., & Labudde, R. A. (2009). Revisiting qualms about bootstrap confidence intervals. *American Journal of Mathematical and Management Sciences*, 29(3-4), 437-456. doi:10.1080/01966324.2009.10737767
- Chorpita, B. F., Albano, A. M., & Barlow, D. H. (1996). Cognitive processing in children: Relation to anxiety and family influences. *Journal of Clinical Child Psychology*, 25(2), 170-176. doi:10.1207/s15374424jccp2502_5
- Chorpita, B. F., & Barlow, D. H. (1998). The development of anxiety: The role of control in the early environment. *Psychological Bulletin*, 124(3), 3-21. doi:10.1037/0033-2909.124.1.3
- Chorpita, B. F., Brown, T. A., & Barlow, D. H. (2016). Perceived control as a mediator of family environment in etiological models of childhood anxiety. *Behavior Therapy*, 47(5), 622-632. doi:10.1016/j.beth.2016.08.008
- Cleveland, E. S., & Reese, E. (2005). Maternal Structure and Autonomy Support in Conversations About the Past: Contributions to Children's Autobiographical Memory. *Developmental Psychology*, 41(2), 376-388. doi:10.1037/0012-1649.41.2.376
- Cleveland, E. S., Reese, E., & Grolnick, W. S. (2007). Children's engagement and competence in personal recollection: Effects of parents' reminiscing goals. *Journal of Experimental Child Psychology*, 96(2), 131-149. doi:10.1016/j.jecp.2006.09.003
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155-159. doi:10.1037/0033-2909.112.1.155
- Coles, M. E., & Heimberg, R. G. (2002). Memory biases in the anxiety disorders. *Clinical Psychology Review*, 22(4), 587-627. doi:10.1016/S0272-7358(01)00113-1
- Costello, E., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry*, 60(8), 837-844. doi:10.1001/archpsyc.60.8.837
- Costello, E. J., Egger, H. L., Copeland, W., Erkanli, A., & Angold, A. (2011). The developmental epidemiology of anxiety disorders: Phenomenology, prevalence, and

- comorbidity. In W. K. Silverman & A. P. Field (Eds.), *Anxiety disorders in children and adolescents* (2nd ed., pp. 56-75). Cambridge, UK: Cambridge University Press.
- Craske, M. G. (1997). Fear and anxiety in children and adolescents. *Bulletin of the Menninger Clinic*, 61(2), A4-A36. Retrieved from <http://europepmc.org/>
- Crawford, J. R., & Henry, J. D. (2003). The depression anxiety stress scales (DASS): Normative data and latent structure in a large non-clinical sample. *British Journal of Clinical Psychology*, 42(2), 111-131. doi:10.1348/014466503321903544
- Creswell, C., Cooper, P., & Murray, L. (2010). Intergenerational transmission of anxious information processing biases. In J. A. Hadwin & A. P. Field (Eds.), *Information processing biases and anxiety: A developmental perspective* (pp. 279-295). Chichester, UK: John Wiley & Sons Ltd.
- Creswell, C., Murray, L., Stacey, J., & Cooper, P. (2011). Parenting and child anxiety. In W. K. Silverman & A. P. Field (Eds.), *Anxiety disorders in children and adolescents* (2nd ed., pp. 299-322). Cambridge, UK: Cambridge University Press.
- Creswell, C., O'Connor, T. G., & Brewin, C. R. (2008). The impact of parents' expectations on parenting behaviour: An experimental investigation. *Behavioural and Cognitive Psychotherapy*, 36(4), 483-490. doi:10.1017/S1352465808004414
- Creswell, C., & O'Connor, T. G. (2010). Interpretation bias and anxiety in childhood: Stability, specificity and longitudinal associations. *Behavioural and Cognitive Psychotherapy*, 39(2), 191-204. doi:10.1017/S1352465810000494
- Creswell, C., Shildrick, S., & Field, A. P. (2011). Interpretation of ambiguity in children: A prospective study of associations with anxiety and parental interpretations. *Journal of Child and Family Studies*, 20(2), 240-250. doi:10.1007/s10826-010-9390-7
- Cristea, I. A., Kok, R. N., & Cuijpers, P. (2015). Efficacy of cognitive bias modification interventions in anxiety and depression: Meta-analysis. *The British Journal of Psychiatry*, 206(1), 7-16. doi:10.1192/bjp.bp.114.146761
- Cui, L., Morris, A. S., Criss, M. M., Houlberg, B. J., & Silk, J. S. (2014). Parental psychological control and adolescent adjustment: The role of adolescent emotion regulation. *Parenting*, 14(1), 47-67. doi:10.1080/15295192.2014.880018
- Dadds, M. R., Barrett, P. M., Rapee, R. M., & Ryan, S. (1996). Family process and child anxiety and aggression: An observational analysis. *Journal of Abnormal Child Psychology*, 24(6), 715-734. doi:10.1007/bf01664736

- Daleiden, E. L. (1998). Childhood anxiety and memory functioning: A comparison of systemic and processing accounts. *Journal of Experimental Child Psychology*, 68(3), 216-235. doi:10.1006/jecp.1997.2429
- Daleiden, E. L., & Vasey, M. W. (1997). An information-processing perspective on childhood anxiety. *Clinical Psychology Review*, 17(4), 407-429. doi:10.1016/S0272-7358(97)00010-X
- Dalglish, T., Taghavi, R., Neshat-Doost, H., Moradi, A., Canterbury, R., & Yule, W. (2003). Patterns of processing bias for emotional information across clinical disorders: A comparison of attention, memory, and prospective cognition in children and adolescents with depression, generalized anxiety, and posttraumatic stress disorder. *Journal of Clinical Child & Adolescent Psychology*, 32(1), 10-21. doi:10.1207/S15374424JCCP3201_02
- Dodd, H. F., Hudson, J. L., Morris, T. M., & Wise, C. K. (2012). Interpretation bias in preschool children at risk for anxiety: A prospective study. *Journal of Abnormal Psychology*, 121(1), 28-38. doi:10.1037/a0024589
- Dodd, H. F., Stuijzand, S., Morris, T., & Hudson, J. L. (2015). Child anxiety and the processing of ambiguity. *Cognitive Therapy and Research*, 39(5), 669-677. doi:10.1007/s10608-015-9689-1
- Du Prel, J. B., Hommel, G., Röhrig, B., & Blettner, M. (2009). Confidence interval or p-value?: Part 4 of a series on evaluation of scientific publications. *Deutsches Ärzteblatt International*, 106(19), 335-339. doi:10.3238/arztebl.2009.0335
- Efron, B., & Tibshirani, R. J. (1993). *An introduction to the bootstrap: monographs on statistics and applied probability*. New York, NY: Chapman and Hall/CRC.
- Eley, T. C., Bolton, D., O'Connor, T. G., Perrin, S., Smith, P., & Plomin, R. (2003). A twin study of anxiety-related behaviours in pre-school children. *Journal of Child Psychology and Psychiatry*, 44(7), 945-960. doi:10.1111/1469-7610.00179
- Eley, T. C., Gregory, A. M., Lau, J. Y. F., McGuffin, P., Napolitano, M., Rijdsdijk, F. V., & Clark, D. M. (2008). In the face of uncertainty: A twin study of ambiguous information, anxiety and depression in children. *Journal of Abnormal Child Psychology*, 36(1), 55-65. doi:10.1007/s10802-007-9159-7
- Everaert, J., Duyck, W., & Koster, E. H. W. (2014). Attention, interpretation, and memory biases in subclinical depression: A proof-of-principle test of the combined cognitive biases hypothesis. *Emotion*, 14(2), 331-340. doi:10.1037/a0035250

- Everaert, J., Tierens, M., Uzieblo, K., & Koster, E. H. W. (2013). The indirect effect of attention bias on memory via interpretation bias: Evidence for the combined cognitive bias hypothesis in subclinical depression. *Cognition and Emotion*, 27(8), 1450-1459. doi:10.1080/02699931.2013.787972
- Field, A. (2009). *Discovering statistics using SPSS* (4th ed.). London, UK: Sage publications.
- Field, Z. C., & Field, A. P. (2013). How trait anxiety, interpretation bias and memory affect acquired fear in children learning about new animals. *Emotion*, 13(3), 409-423. doi:10.1037/a0031147
- Field, A. P., Hadwin, J. A., & Lester, K. J. (2011). Information processing biases in child and adolescent anxiety: A developmental perspective. In W. K. Silverman & A. P. Field (Eds.), *Anxiety disorders in children and adolescents* (2nd ed., pp. 103-128). Cambridge, UK: Cambridge University Press.
- Field, A. P., & Lawson, J. (2003). Fear information and the development of fears during childhood: effects on implicit fear responses and behavioural avoidance. *Behaviour Research and Therapy*, 41(11), 1277-1293. doi:10.1016/S0005-7967(03)00034-2
- Field, A. P., & Storksen-Coulson, H. (2007). The interaction of pathways to fear in childhood anxiety: A preliminary study. *Behaviour Research and Therapy*, 45(12), 3051-3059. doi: 10.1016/j.brat.2007.09.001
- Fonseca, A. C., & Perrin, S. (2011). The clinical phenomenology and classification of child and adolescent anxiety. In W. K. Silverman & A. P. Field (Eds.), *Anxiety disorders in children and adolescents* (2nd ed., pp. 25-54). Cambridge, UK: Cambridge University Press.
- Ford, T., Goodman, R., & Meltzer, H. (2003). The british child and adolescent mental health survey 1999: The prevalence of DSM-IV disorders. *Journal of the American Academy of Child & Adolescent Psychiatry*, 42(10), 1203-1211. doi:10.1097/00004583-200310000-00011
- Fredrikson, M., Annas, P., Fischer, H., & Wik, G. (1996). Gender and age differences in the prevalence of specific fears and phobias. *Behaviour Research and Therapy*, 34(1), 33-39. doi:10.1016/0005-7967(95)00048-3
- Gallagher, K. C. (2002). Does child temperament moderate the influence of parenting on adjustment? *Developmental Review*, 22(4), 623-643. doi:10.1016/S0273-2297(02)00503-8
- Gotlib, I. H., Kasch, K. L., Traill, S., Joormann, J., Arnow, B. A., & Johnson, S. L. (2004). Coherence and specificity of information-processing biases in depression and social

- phobia. *Journal of Abnormal Psychology*, 113(3), 386-398. doi:10.1037/0021-843X.113.3.386
- Gouze, K. R., Hopkins, J., Bryant, F. B., & Lavigne, J. V. (2017). Parenting and anxiety: Bidirectional relations in young children. *Journal of Abnormal Child Psychology*, 45(6), 1169-1180. doi:10.1007/s10802-016-0223-z
- Gullone, E. (2000). The development of normal fear. *Clinical Psychology Review*, 20(4), 429-451. doi:10.1016/S0272-7358(99)00034-3
- Gullone, E., & King, N. J. (1993). The fears of youth in the 1990s: Contemporary normative data. *The Journal of Genetic Psychology*, 154(2), 137-153. doi:10.1080/00221325.1993.9914728
- Gullone, E., & King, N. J. (1997). Three-year follow-up of normal fear in children and adolescents aged 7 to 18 years. *British Journal of Developmental Psychology*, 15(1), 97-111. doi:10.1111/j.2044-835X.1997.tb00727.x
- Hadwin, J., Frost, S., French, C. C., & Richards, A. (1997). Cognitive processing and trait anxiety in typically developing children: Evidence for an interpretation bias. *Journal of Abnormal Psychology*, 106(3), 486-490. doi:10.1037/0021-843X.106.3.486
- Hadwin, J. A., Garner, M., & Perez-Olivas, G. (2006). The development of information processing biases in childhood anxiety: A review and exploration of its origins in parenting. *Clinical Psychology Review*, 26(7), 876-894. doi:10.1016/j.cpr.2005.09.004
- Hallion, L. S., & Ruscio, A. M. (2011). A meta-analysis of the effect of cognitive bias modification on anxiety and depression. *Psychological Bulletin*, 137(6), 940-958. doi:10.1037/a0024355
- Hammond, M. D., & Overall, N. C. (2015). Benevolent sexism and support of romantic partner's goals. *Personality and Social Psychology Bulletin*, 41(9), 1180-1194. doi:10.1177/0146167215593492
- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the depression anxiety stress scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227-239. doi:10.1348/014466505X29657
- Herrera, S., Montorio, I., Cabrera, I., & Botella, J. (2017). Memory bias for threatening information related to anxiety: An updated meta-analytic review. *Journal of Cognitive Psychology*, 1-23. doi:10.1080/20445911.2017.1319374

- Hertel, P. T., & Brozovich, F. (2010). Cognitive habits and memory distortions in anxiety and depression. *Current Directions in Psychological Science*, 19(3), 155-160.
doi:10.1177/0963721410370137
- Hertel, P. T., Brozovich, F., Joormann, J., & Gotlib, I. H. (2008). Biases in interpretation and memory in generalized social phobia. *Journal of Abnormal Psychology*, 117(2), 278-288. doi:10.1037/0021-843X.117.2.278
- Hettema, J. M., Prescott, C. A., Myers, J. M., Neale, M. C., & Kendler, K. S. (2005). The structure of genetic and environmental risk factors for anxiety disorders in men and women. *Archives of General Psychiatry*, 62(2), 182-189.
doi:10.1001/archpsyc.62.2.182
- Higa, C. K., & Daleiden, E. L. (2008). Social anxiety and cognitive biases in non-referred children: The interaction of self-focused attention and threat interpretation biases. *Journal of Anxiety Disorders*, 22(3), 441-452. doi:10.1016/j.janxdis.2007.05.005
- Hirsch, C. R., Clark, D. M., & Mathews, A. (2006). Imagery and interpretations in social phobia: Support for the combined cognitive biases hypothesis. *Behavior Therapy*, 37(3), 223-236. doi:10.1016/j.beth.2006.02.001
- Hirsch, C. R., Meeten, F., Krahé, C., & Reeder, C. (2016). Resolving ambiguity in emotional disorders: The nature and role of interpretation biases. *Annual Review of Clinical Psychology*, 12(1), 281-305. doi:10.1146/annurev-clinpsy-021815-093436
- Hudson, J. L., Comer, J. S., & Kendall, P. C. (2008). Parental responses to positive and negative emotions in anxious and nonanxious children. *Journal of Clinical Child & Adolescent Psychology*, 37(2), 303-313. doi:10.1080/15374410801955839
- Hudson, J. L., & Dodd, H. F. (2012). Informing early intervention: Preschool predictors of anxiety disorders in middle childhood. *PLOS ONE*, 7(8), e42359.
doi:10.1371/journal.pone.0042359
- Hudson, J. L., & Rapee, R. M. (2001). Parent-child interactions and anxiety disorders: an observational study. *Behaviour Research and Therapy*, 39(12), 1411-1427.
doi:10.1016/S0005-7967(00)00107-8
- In-Albon, T., Dubi, K., Rapee, R. M., & Schneider, S. (2009). Forced choice reaction time paradigm in children with separation anxiety disorder, social phobia, and nonanxious controls. *Behaviour Research and Therapy*, 47(12), 1058-1065.
doi:10.1016/j.brat.2009.08.003

- Johnsen, G. E., & Asbjørnsen, A. E. (2008). Consistent impaired verbal memory in PTSD: A meta-analysis. *Journal of Affective Disorders*, 111(1), 74-82.
doi:10.1016/j.jad.2008.02.007
- Johnson, M. K. (1997). Source monitoring and memory distortion. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 352(1362), 1733-1745. doi:10.1098/rstb.1997.0156
- Johnson, M. K., & Raye, C. L. (1981). Reality monitoring. *Psychological Review*, 88(1), 67-85. doi:10.1037/0033-295X.88.1.67
- Joormann, J., Waugh, C. E., & Gotlib, I. H. (2015). Cognitive bias modification for interpretation in major depression. *Clinical Psychological Science*, 3(1), 126-139. doi:10.1177/2167702614560748
- Kendall, P. C. (1985). Toward a cognitive-behavioral model of child psychopathology and a critique of related interventions. *Journal of Abnormal Child Psychology*, 13(3), 357-372. doi:10.1007/BF00912722
- Kendall, P. C. (2006). Guiding theory for therapy with children and adolescents. In P. C. Kendall (Ed.), *Child and adolescent therapy: Cognitive-behavioral procedures* (3rd ed., pp. 3-32). New York, NY: Guildford Press.
- Kessler, R. C., Chiu, W., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*, 62(6), 617-627. doi:10.1001/archpsyc.62.6.617
- Kessler, R. C., Ruscio, A. M., Shear, K., & Wittchen, H. U. (2009). Epidemiology of anxiety disorders. In M. B. Stein & T. Steckler (Eds.), *Behavioral neurobiology of anxiety and its treatment* (pp. 21-35). Heidelberg, Germany: Springer-Verlag Berlin.
- King, N. J., Ollendick, T. H., & Gullone, E. (1991). Test anxiety in children and adolescents. *Australian Psychologist*, 26(1), 25-32. doi:10.1080/00050069108258829
- Klein, A. M., Titulaer, G., Simons, C., Allart, E., de Gier, E., Bögels, S. M., . . . Rinck, M. (2014). Biased interpretation and memory in children with varying levels of spider fear. *Cognition and Emotion*, 28(1), 182-192. doi:10.1080/02699931.2013.810144
- Klein, A. M., van Niekirk, R. E., Baartmans, J. M. D., Rinck, M., & Becker, E. S. (2016). The spider anxiety and disgust screening for children: Reliability and validity of a screening for children. *Australian Journal of Psychology*, 69(3), 178-183. doi:10.1111/ajpy.12132

- Klein, S. B. (2013). The temporal orientation of memory: It's time for a change of direction. *Journal of Applied Research in Memory and Cognition*, 2(4), 222-234.
doi:10.1016/j.jarmac.2013.08.001
- Kovacs, M. (1992). *Manual for the Children's Depression Inventory*. North Tonawanda, NJ: Multi-Health Systems.
- Kringlen, E., Torgersen, S., & Cramer, V. (2001). A Norwegian psychiatric epidemiological study. *American Journal of Psychiatry*, 158(7), 1091-1098.
doi:10.1176/appi.ajp.158.7.1091
- Krohne, H. W., & Hock, M. (1991). Relationships between restrictive mother-child interactions and anxiety of the child. *Anxiety Research*, 4(2), 109-124.
doi:10.1080/08917779108248768
- Kushner, M. G., Abrams, K., & Borchardt, C. (2000). The relationship between anxiety disorders and alcohol use disorders. *Clinical Psychology Review*, 20(2), 149-171.
doi:10.1016/S0272-7358(99)00027-6
- La Greca, A. M., & Lopez, N. (1998). Social anxiety among adolescents: Linkages with peer relations and friendships. *Journal of Abnormal Child Psychology*, 26(2), 83-94.
doi:10.1023/a:1022684520514
- Lagattuta, K. H., Sayfan, L., & Bamford, C. (2012). Do you know how I feel? Parents underestimate worry and overestimate optimism compared to child self-report. *Journal of Experimental Child Psychology*, 113(2), 211-232.
doi:10.1016/j.jecp.2012.04.001
- Lau, J. Y. F. (2013). Cognitive bias modification of interpretations: A viable treatment for child and adolescent anxiety? *Behaviour Research and Therapy*, 51(10), 614-622.
doi:10.1016/j.brat.2013.07.001
- Lau, J. Y. F., Hilbert, K., Goodman, R., Gregory, A. M., Pine, D. S., Viding, E. M., & Eley, T. C. (2012). Investigating the genetic and environmental bases of biases in threat recognition and avoidance in children with anxiety problems. *Biology of Mood & Anxiety Disorders*, 2(1), 12. doi:10.1186/2045-5380-2-12
- Lau, J. Y. F., Pettit, E., & Creswell, C. (2013). Reducing children's social anxiety symptoms: Exploring a novel parent-administered cognitive bias modification training intervention. *Behaviour Research and Therapy*, 51(7), 333-337.
doi:http://dx.doi.org/10.1016/j.brat.2013.03.008

- Lewinsohn, P. M., Gotlib, I. H., Lewinsohn, M., Seeley, J. R., & Allen, N. B. (1998). Gender differences in anxiety disorders and anxiety symptoms in adolescents. *Journal of Abnormal Psychology, 107*(1), 109-117. doi:10.1037/0021-843X.107.1.109
- Lewis-Morrarty, E., Degnan, K. A., Chronis-Tuscano, A., Rubin, K. H., Cheah, C. S. L., Pine, D. S., . . . Fox, N. A. (2012). Maternal over-control moderates the association between early childhood behavioral inhibition and adolescent social anxiety symptoms. *Journal of Abnormal Child Psychology, 40*(8), 1363-1373. doi:10.1007/s10802-012-9663-2
- Lieb, R., Wittchen, H., Höfler, M., Fuetsch, M., Stein, M. B., & Merikangas, K. R. (2000). Parental psychopathology, parenting styles, and the risk of social phobia in offspring: A prospective-longitudinal community study. *Archives of General Psychiatry, 57*(9), 859-866. doi:10.1001/archpsyc.57.9.859
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*(3), 335-343. doi:10.1016/0005-7967(94)00075-U
- Magee, W. J., Eaton, W. W., Wittchen, H., McGonagle, K. A., & Kessler, R. C. (1996). Agoraphobia, simple phobia, and social phobia in the national comorbidity survey. *Archives of General Psychiatry, 53*(2), 159-168. doi:10.1001/archpsyc.1996.01830020077009
- Majdandžić, M., Möller, E. L., de Vente, W., Bögels, S. M., & van den Boom, D. C. (2014). Fathers' challenging parenting behavior prevents social anxiety development in their 4-year-old children: A longitudinal observational study. *Journal of Abnormal Child Psychology, 42*(2), 301-310. doi:10.1007/s10802-013-9774-4
- Mathews, A., & Mackintosh, B. (2000). Induced emotional interpretation bias and anxiety. *Journal of Abnormal Psychology, 109*(4), 602-615. doi:10.1037/0021-843X.109.4.602
- Matt, G. E., Vázquez, C., & Campbell, W. K. (1992). Mood-congruent recall of affectively toned stimuli: A meta-analytic review. *Clinical Psychology Review, 12*(2), 227-255. doi:10.1016/0272-7358(92)90116-P
- McLean, C. P., & Anderson, E. R. (2009). Brave men and timid women? A review of the gender differences in fear and anxiety. *Clinical Psychology Review, 29*(6), 496-505. doi:10.1016/j.cpr.2009.05.003

- McLeod, B. D., Wood, J. J., & Weisz, J. R. (2007). Examining the association between parenting and childhood anxiety: A meta-analysis. *Clinical Psychology Review*, 27(2), 155-172. doi:10.1016/j.cpr.2006.09.002
- Merikangas, K. R. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: Results from the National Comorbidity Survey Replication-Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry*, 49(10), 980-989.
- Miers, A. C., Blöte, A. W., Bögels, S. M., & Westenberg, P. M. (2008). Interpretation bias and social anxiety in adolescents. *Journal of Anxiety Disorders*, 22(8), 1462-1471. doi:10.1016/j.janxdis.2008.02.010
- Mitchell, J. H., Broeren, S., Newall, C., & Hudson, J. L. (2013). An experimental manipulation of maternal perfectionistic anxious rearing behaviors with anxious and non-anxious children. *Journal of Experimental Child Psychology*, 116(1), 1-18. doi:10.1016/j.jecp.2012.12.006
- Mitchell, K. J., & Johnson, M. K. (2009). Source monitoring 15 years later: What have we learned from fMRI about the neural mechanisms of source memory? *Psychological Bulletin*, 135(4), 638-677. doi:10.1037/a0015849
- Mitte, K. (2008). Memory bias for threatening information in anxiety and anxiety disorders: A meta-analytic review. *Psychological Bulletin*, 134(6), 886-911. doi:10.1037/a0013343
- Mobini, S., Reynolds, S., & Mackintosh, B. (2013). Clinical implications of cognitive bias modification for interpretative biases in social anxiety: An integrative literature review. *Cognitive Therapy and Research*, 37(1), 173-182. doi:10.1007/s10608-012-9445-8
- Möller, E. L., Nikolić, M., Majdandžić, M., & Bögels, S. M. (2016). Associations between maternal and paternal parenting behaviors, anxiety and its precursors in early childhood: A meta-analysis. *Clinical Psychology Review*, 45, 17-33. doi:10.1016/j.cpr.2016.03.002
- Moore, P. S., Whaley, S. E., & Sigman, M. (2004). Interactions between mothers and children: Impacts of maternal and child anxiety. *Journal of Abnormal Psychology*, 113(3), 471-476. doi:10.1037/0021-843X.113.3.471
- Muris, P., & Field, A. P. (2008). Distorted cognition and pathological anxiety in children and adolescents. *Cognition and Emotion*, 22(3), 395-421. doi:10.1080/02699930701843450

- Muris, P., & Field, A. P. (2010). The role of verbal threat information in the development of childhood fear. "Beware the Jabberwock!". *Clinical Child and Family Psychology Review*, 13(2), 129-150. doi:10.1007/s10567-010-
- Muris, P., & Field, A. (2011). The "normal" development of fear. In W. K. Silverman & A. P. Field (Eds.), *Anxiety disorders in children and adolescents* (2nd ed., pp. 76-89). Cambridge, UK: Cambridge University Press.
- Muris, P., Kindt, M., Bögels, S., Merckelbach, H., Gadet, B., & Moulaert, V. (2000). Anxiety and threat perception abnormalities in normal children. *Journal of Psychopathology and Behavioral Assessment*, 22(2), 183-199. doi:10.1023/a:1007588524525
- Muris, P., Luermans, J., Merckelbach, H., & Mayer, B. (2000). "Danger is lurking everywhere". The relation between anxiety and threat perception abnormalities in normal children. *Journal of Behavior Therapy and Experimental Psychiatry*, 31(2), 123-136. doi:10.1016/S0005-7916(00)00016-1
- Muris, P., Meesters, C., Smulders, L., & Mayer, B. (2005). Threat perception distortions and psychopathological symptoms in typically developing children. *Infant and Child Development*, 14(3), 273-285. doi:10.1002/icd.392
- Muris, P., Merckelbach, H., & Damsma, E. (2000). Threat perception bias in nonreferred, socially anxious children. *Journal of Clinical Child & Adolescent Psychology*, 29(3), 348-359. doi:10.1207/S15374424JCCP2903_6
- Muris, P., Merckelbach, H., Gadet, B., & Moulaert, V. (2000). Fears, worries, and scary dreams in 4- to 12-year-old children: Their content, developmental pattern, and origins. *Journal of Clinical Child Psychology*, 29(1), 43-52. doi:10.1207/S15374424jccp2901_5
- Muris, P., Merckelbach, H., Mayer, B., & Prins, E. (2000). How serious are common childhood fears? *Behaviour Research and Therapy*, 38(3), 217-228. doi:10.1016/S0005-7967(98)00204-6
- Muris, P., Merckelbach, H., Meesters, C., & Van Lier, P. (1997). What do children fear most often? *Journal of Behavior Therapy and Experimental Psychiatry*, 28(4), 263-267. doi:10.1016/S0005-7916(97)00024-4
- Muris, P., Merckelbach, H., Ollendick, T., King, N., & Bogie, N. (2002). Three traditional and three new childhood anxiety questionnaires: their reliability and validity in a normal adolescent sample. *Behaviour Research and Therapy*, 40(7), 753-772. doi:10.1016/S0005-7967(01)00056-0

- Muris, P., Rapee, R., Meesters, C., Schouten, E., & Geers, M. (2003). Threat perception abnormalities in children: the role of anxiety disorders symptoms, chronic anxiety, and state anxiety. *Journal of Anxiety Disorders*, 17(3), 271-287.
doi:10.1016/S0887-6185(02)00199-8
- Muris, P., Verweij, C., & Meesters, C. (2012). The “anti-monster Letter” as a simple therapeutic tool for reducing night-time fears in young children. *Behaviour Change*, 20(4), 200-207. doi:10.1375/bech.20.4.200.29384
- Murray, L., Creswell, C., & Cooper, P. J. (2009). The development of anxiety disorders in childhood: An integrative review. *Psychological Medicine*, 39(9), 1413-1423.
doi:10.1017/S0033291709005157
- Murray, L., Pella, J. E., De Pascalis, L., Arteche, A., Pass, L., Percy, R., . . . Cooper, P. J. (2014). Socially anxious mothers' narratives to their children and their relation to child representations and adjustment. *Development and Psychopathology*, 26(4), 1531-1546. doi:10.1017/S0954579414001187
- Nelson, K., & Fivush, R. (2004). The emergence of autobiographical memory: A social cultural developmental theory. *Psychological Review*, 111(2), 486-511.
doi:10.1037/0033-295X.111.2.486
- Oliver, E. J., Markland, D., Hardy, J., & Petherick, C. M. (2008). The effects of autonomy-supportive versus controlling environments on self-talk. *Motivation and Emotion*, 32(3), 200-212. doi:10.1007/s11031-008-9097-x
- Ollendick, T. H., & Benoit, K. E. (2012). A parent-child interactional model of social anxiety disorder in youth. *Clinical Child and Family Psychology Review*, 15(1), 81-91.
doi:10.1007/s10567-011-0108-1
- Ollendick, H., Grills, A., & Alexander, K. (2001). Fears, worries, and anxiety in children and adolescents. In C. Essau & F. Petermann (Eds.), *Anxiety disorders in children and adolescents* (pp. 1-35). New York: Psychology Press.
- Ollendick, T. H., King, N. J., & Frary, R. B. (1989). Fears in children and adolescents: Reliability and generalizability across gender, age and nationality. *Behaviour Research and Therapy*, 27(1), 19-26. doi:10.1016/0005-7967(89)90115-0
- Ollendick, T. H., Matson, J. L., & Helsel, W. J. (1985). Fears in children and adolescents: normative data. *Behaviour Research and Therapy*, 23(4), 465-467. doi:10.1016/0005-7967(85)90174-3

- Ollendick, T. H., Yule, W., & Oilier, K. (1991). Fears in british children and their relationship to manifest anxiety and depression. *Journal of Child Psychology and Psychiatry*, 32(2), 321-331. doi:10.1111/j.1469-7610.1991.tb00310.x
- Orchard, F., Cooper, P. J., & Creswell, C. (2015). Interpretation and expectations among mothers of children with anxiety disorders: Associations with maternal anxiety disorder. *Depression and Anxiety*, 32(2), 99-107. doi:10.1002/da.22211
- Orgilés, M., Fernández-Martínez, I., Guillén-Riquelme, A., Espada, J. P., & Essau, C. A. (2016). A systematic review of the factor structure and reliability of the Spence Children's Anxiety Scale. *Journal of Affective Disorders*, 190, 333-340. doi:10.1016/j.jad.2015.09.055
- Oyebode, F. (2008). *Sims' symptoms in the mind: An introduction to descriptive psychopathology* (4th ed.). Croydon, UK: CPI Group.
- Pass, L., Arteché, A., Cooper, P., Creswell, C., & Murray, L. (2012). Doll play narratives about starting school in children of socially anxious mothers, and their relation to subsequent child school-based anxiety. *Journal of Abnormal Child Psychology*, 40(8), 1375-1384. doi:10.1007/s10802-012-9645-4
- Percy, R., Creswell, C., Garner, M., O'Brien, D., & Murray, L. (2016). Parents' verbal communication and childhood anxiety: A systematic review. *Clinical Child and Family Psychology Review*, 19(1), 55-75. doi:10.1007/s10567-015-0198-2
- Pereira, A. I., Barros, L., Mendonça, D., & Muris, P. (2014). The relationships among parental anxiety, parenting, and children's anxiety: The mediating effects of children's cognitive vulnerabilities. *Journal of Child and Family Studies*, 23(2), 399-409. doi:10.1007/s10826-013-9767-5
- Pettit, G. S., Laird, R. D., Dodge, K. A., Bates, J. E., & Criss, M. M. (2001). Antecedents and behavior-problem outcomes of parental monitoring and psychological control in early adolescence. *Child Development*, 72(2), 583-598. doi:10.1111/1467-8624.00298
- Pine, D. S. (2007). Research review: a neuroscience framework for pediatric anxiety disorders. *Journal of Child Psychology and Psychiatry*, 48(7), 631-648. doi:10.1111/j.1469-7610.2007.01751.x
- Rapee, R. M. (2001). The development of generalized anxiety. In M. W. Vasey & M. R. Dadds (Eds.), *The developmental psychopathology of anxiety* (pp. 481-503). New York, NY: Oxford University Press.

- Rapee, R. M., Schniering, C. A., & Hudson, J. L. (2009). Anxiety disorders during childhood and adolescence: Origins and treatment. *Annual Review of Clinical Psychology*, 5(1), 311-341. doi:10.1146/annurev.clinpsy.032408.153628
- Reese, E., Bird, A., & Tripp, G. (2007). Children's self-esteem and moral self: Links to parent-child conversations regarding emotion. *Social Development*, 16(3), 460-478. doi:10.1111/j.1467-9507.2007.00393.x
- Reid, S. C., Salmon, K., & Lovibond, P. F. (2006). Cognitive biases in childhood anxiety, depression, and aggression: Are they pervasive or specific? *Cognitive Therapy and Research*, 30(5), 531-549. doi:10.1007/s10608-006-9077-y
- Reiss, S., Silverman, W. K., & Weems, C. F. (2001). Anxiety sensitivity. In M. W. Vasey & M. R. Dadds (Eds.), *The developmental psychopathology of anxiety* (pp. 92-111). New York, NY: Oxford University Press.
- Reynolds, C. R., & Richmond, B. O. (1978). What I think and feel: A revised measure of children's manifest anxiety. *Journal of Abnormal Child Psychology*, 6(2), 271-280. doi:10.1007/bf00919131
- Roberts, K. P., & Blades, M. (1999). Children's memory and source monitoring of real-life and televised events. *Journal of Applied Developmental Psychology*, 20(4), 575-596. doi: 10.1016/S0193-3973(99)00030-1
- Russo, M. F., & Beidel, D. C. (1994). Comorbidity of childhood anxiety and externalizing disorders: Prevalence, associated characteristics, and validation issues. *Clinical Psychology Review*, 14(3), 199-221. doi:10.1016/0272-7358(94)90008-6
- Salmon, K., & O'Kearney, R. (2013). Emotional memory, psychopathology, and well-being. In P. J. Bauer & R. Fivush (Eds.), *The Wiley handbook on the development of children's memory* (Vol. I/II, pp. 743-773). Chichester, UK: John Wiley & Sons Ltd.
- Salmon, K., & Reese, E. (2016). The benefits of reminiscing with young children. *Current Directions in Psychological Science*, 25(4), 233-238. doi:10.1177/0963721416655100
- Schneider, W., Eschman, A., & Zuccolotto, A. (2002). *E-Prime: User's guide*. Psychology Software Incorporated.
- Schrock, M., & Woodruff-Borden, J. (2010). Parent-child interactions in anxious families. *Child & Family Behavior Therapy*, 32(4), 291-310. doi:10.1080/07317107.2010.515523
- Seligman, L. D., Ollendick, T. H., Langley, A. K., & Baldacci, H. B. (2004). The utility of measures of child and adolescent anxiety: A meta-analytic review of the revised children's manifest anxiety scale, the state-trait anxiety inventory for children, and the

- child behavior checklist. *Journal of Clinical Child & Adolescent Psychology*, 33(3), 557-565. doi:10.1207/s15374424jccp3303_13
- Shaffer, D., Fisher, P., Dulcan, M. K., Davies, M., Piacentini, J., Schwab-Stone, M. E., . . . Regier, D. A. (1996). The NIMH diagnostic interview schedule for children version 2.3 (DISC-2.3): Description, acceptability, prevalence rates, and performance in the MECA study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 35(7), 865-877. doi:10.1097/00004583-199607000-00012
- Silk, J. S., Morris, A. S., Kanaya, T., & Steinberg, L. (2003). Psychological control and autonomy granting: Opposite ends of a continuum or distinct constructs? *Journal of Research on Adolescence*, 13(1), 113-128. doi:10.1111/1532-7795.1301004
- Silverman, W. K., Fleisig, W., Rabian, B., & Peterson, R. A. (1991). Childhood anxiety sensitivity index. *Journal of Clinical Child Psychology*, 20(2), 162-168. doi:10.1207/s15374424jccp2002_7
- Silverman, W. K., & Nelles, W. B. (1988). The anxiety disorders interview schedule for children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 27(6), 772-778. doi:10.1097/00004583-198811000-00019
- Siqueland, L., Kendall, P. C., & Steinberg, L. (1996). Anxiety in children: Perceived family environments and observed family interaction. *Journal of Clinical Child Psychology*, 25(2), 225-237. doi:10.1207/s15374424jccp2502_12
- Spence, S. H. (1998). A measure of anxiety symptoms among children. *Behaviour Research and Therapy*, 36(5), 545-566. doi:10.1016/S0005-7967(98)00034-5
- Spence, S. H., Rapee, R., McDonald, C., & Ingram, M. (2001). The structure of anxiety symptoms among preschoolers. *Behaviour Research and Therapy*, 39(11), 1293-1316. doi:10.1016/S0005-7967(00)00098-X
- Spielberger, C. D. (1973). *Preliminary test manual for the State-Trait Anxiety Inventory for Children*. Palo Alto, CA: Consulting Psychologists Press, Inc.
- Spielberger, C. D. (1985). Assessment of state and trait anxiety: Conceptual and methodological issues. *Southern Psychologist*, 2, 6-16.
- Surcinelli, P., Codispoti, M., Montebarcii, O., Rossi, N., & Baldaro, B. (2006). Facial emotion recognition in trait anxiety. *Journal of Anxiety Disorders*, 20, 110-117. doi:10.1016/j.janxdis.2004.11.010
- Suveg, C., Sood, E., Barmish, A., Tiwari, S., Hudson, J. L., & Kendall, P. C. (2008). "I'd rather not talk about it": Emotion parenting in families of children with an anxiety disorder. *Journal of Family Psychology*, 22(6), 875-884. doi:10.1037/a0012861

- Suveg, C., Zeman, J., Flannery-Schroeder, E., & Cassano, M. (2005). Emotion socialization in families of children with an anxiety disorder. *Journal of Abnormal Child Psychology*, 33(2), 145-155. doi:10.1007/s10802-005-1823-1
- Taghavi, M. R., Moradi, A. R., Neshat-Doost, H. T., Yule, W., & Dalgleish, T. (2000). Interpretation of ambiguous emotional information in clinically anxious children and adolescents. *Cognition and Emotion*, 14(6), 809-822. doi:10.1080/02699930050156645
- Thapar, A., Collishaw, S., Pine, D. S., & Thapar, A. K. (2012). Depression in adolescence. *The Lancet*, 379(9820), 1056-1067. doi:10.1016/S0140-6736(11)60871-4
- Thirlwall, K., & Creswell, C. (2010). The impact of maternal control on children's anxious cognitions, behaviours and affect: An experimental study. *Behaviour Research and Therapy*, 48(10), 1041-1046. doi:10.1016/j.brat.2010.05.030
- Tran, T. B., Hertel, P. T., & Joormann, J. (2011). Cognitive bias modification: Induced interpretive biases affect memory. *Emotion*, 11(1), 145-152. doi:10.1037/a0021754
- Valla, J. P., Bergeron, L., & Smolla, N. (2000). The Dominic-R: A pictorial interview for 6- to 11-year-old children. *Journal of the American Academy of Child & Adolescent Psychiatry*, 39(1), 85-93. doi:10.1097/00004583-200001000-00020
- van der Bruggen, C. O., Stams, G. J. J. M., & Bögels, S. M. (2008). Research review: The relation between child and parent anxiety and parental control: A meta-analytic review. *Journal of Child Psychology and Psychiatry*, 49(12), 1257-1269. doi:10.1111/j.1469-7610.2008.01898.x
- Vasey, M. W., & Dadds, M. R. (2001). An introduction to the developmental psychopathology of anxiety. In M. W. Vasey & M. R. Dadds (Eds.), *The developmental psychopathology of anxiety* (pp. 3-26). New York, NY: Oxford University Press.
- Vassilopoulos, S. P., & Banerjee, R. (2008). Interpretations and judgments regarding positive and negative social scenarios in childhood social anxiety. *Behaviour Research and Therapy*, 46(7), 870-876. doi:10.1016/j.brat.2008.03.008
- Vassilopoulos, S. P., Banerjee, R., & Prantzalou, C. (2009). Experimental modification of interpretation bias in socially anxious children: Changes in interpretation, anticipated interpersonal anxiety, and social anxiety symptoms. *Behaviour Research and Therapy*, 47(12), 1085-1089. doi:10.1016/j.brat.2009.07.018
- Vicente, B., Kohn, R., Rioseco, P., M. D., Saldivia, S., Levav, I., & Torres, S. (2006). Lifetime and 12-Month prevalence of DSM-III-R D disorders in the Chile psychiatric

- prevalence study. *American Journal of Psychiatry*, 163(8), 1362-1370.
doi:10.1176/ajp.2006.163.8.1362
- Warren, S. L., Emde, R. N., & Sroufe, L. A. (2000). Internal representations: Predicting anxiety from children's play narratives. *Journal of the American Academy of Child & Adolescent Psychiatry*, 39(1), 100-107. doi:10.1097/00004583-200001000-00022
- Waters, A. M., Craske, M. G., Bergman, R. L., & Treanor, M. (2008). Threat interpretation bias as a vulnerability factor in childhood anxiety disorders. *Behaviour Research and Therapy*, 46(1), 39-47. doi:10.1016/j.brat.2007.10.002
- Waters, A. M., Wharton, T. A., Zimmer-Gembeck, M. J., & Craske, M. G. (2008). Threat-based cognitive biases in anxious children: Comparison with non-anxious children before and after cognitive behavioural treatment. *Behaviour Research and Therapy*, 46(3), 358-374. doi:10.1016/j.brat.2008.01.002
- Watts, S. E., & Weems, C. F. (2006). Associations among selective attention, memory bias, cognitive errors and symptoms of anxiety in youth. *Journal of Abnormal Child Psychology*, 34(6), 838-849. doi:10.1007/s10802-006-9066-3
- Weeks, T. L., & Pasupathi, M. (2010). Autonomy, identity, and narrative construction with parents and friends. In K. C. McLean & M. Pasupathi (Eds.), *Narrative development in adolescence: Creating the storied self* (pp. 65-91). Boston, MA: Springer US.
- Weems, C. F., & Watts, S. E. (2005). Cognitive models of childhood anxiety. In C. M. Velonis (Ed.), *Anxiety disorder research* (pp. 205-232). New York, NY: Nova Science Publishers.
- Westenberg, P. M., Drewes, M. J., Goedhart, A. W., Siebelink, B. M., & Treffers, P. D. A. (2004). A developmental analysis of self-reported fears in late childhood through mid-adolescence: social-evaluative fears on the rise? *Journal of Child Psychology and Psychiatry*, 45(3), 481-495. doi:10.1111/j.1469-7610.2004.00239.x
- Whaley, S. E., Pinto, A., & Sigman, M. (1999). Characterizing interactions between anxious mothers and their children. *Journal of Consulting and Clinical Psychology*, 67(6), 826-836. doi:10.1037/0022-006X.67.6.826
- Wisco, B. E., & Nolen-Hoeksema, S. (2010). Interpretation bias and depressive symptoms: The role of self-relevance. *Behaviour Research and Therapy*, 48(11), 1113-1122. doi:10.1016/j.brat.2010.08.004
- Wood, W., & Eagly, A. H. (2002). A cross-cultural analysis of the behavior of women and men: Implications for the origins of sex differences. *Psychological Bulletin*, 128(5), 699-727. doi:10.1037/0033-2909.128.5.699

- Wood, J. J., McLeod, B. D., Sigman, M., Hwang, W. C., & Chu, B. C. (2003). Parenting and childhood anxiety: Theory, empirical findings, and future directions. *Journal of Child Psychology and Psychiatry*, 44(1), 134-151. doi:10.1111/1469-7610.00106
- Yiend, J., Mackintosh, B., & Mathews, A. (2005). Enduring consequences of experimentally induced biases in interpretation. *Behaviour Research and Therapy*, 43(6), 779-797. doi:10.1016/j.brat.2004.06.007
- Zaragoza, M. S., Mitchell, K. J., Payment, K., & Drivdahl, S. (2011). False memories for suggestions: The impact of conceptual elaboration. *Journal of Memory and Language*, 64(1), 18-31. doi:10.1016/j.jml.2010.09.004

Appendix A
Ambiguous Stories and Coding Scheme Employed for the Ambiguous Vignettes
Paradigm in Study 1

Stories

1-Jane is biking down a very busy street. She is going slow because her bag is full of school books. Jane suddenly hears a loud noise. Jane turns her head to see a big truck coming up behind her.

2- It is Jane's first day at a new school. Jane's mum drops her off at the school gate and waves goodbye. Jane doesn't recognise anyone and isn't quite sure where to go. Jane gets a funny feeling in her stomach.

3-Jane is in class at school. Her teacher tells the class that they are going to sit a surprise maths test. The teacher hands out the tests and tells the class to begin. Jane looks at the first question but isn't sure if she knows the right answer.

4-Jane's mum and dad have movie tickets. They are going to go watch the movie after dinner. Jane's mum and dad leave to go to the movies, and tell Jane that she is old enough to stay home alone that night.

5-Jane's mum and dad are going on holiday. On the way to the airport they drop Jane off at her friend's house, where she is staying while they are away. As Jane's mum and dad drive away, Jane realises that her parents didn't tell her when they would be back.

6- Jane's mum and dad are going out for dinner. Before they leave, Jane's mum and dad put her to bed and turn the light out. Jane hears her parents drive off.

7-Jane's teacher tells Jane that she has to give a speech in class. Jane stands up in front of the class. During the speech, her classmates start to laugh.

8-Jane is at school and it is lunchtime. Jane sees a group of other children playing a game. She walks over to join them. As she walks over she notices the children begin to laugh.

9-It is Jane's birthday. Jane's mum has invited some of Jane's friends around for a birthday party. Jane helps to blow up some balloons and then waits for her friends to arrive. Jane waits for a while, but none of her friends have shown up.

10-Jane is walking down her street on her way to school. Jane hears a dog barking. Suddenly a big dog appears from a driveway. It stops and stares at Jane.

11-One day, Jane goes to the park. Jane decides to climb a big tree. When Jane gets to the top she looks down. She suddenly realises that she is very high off the ground, and isn't sure how she can get down again.

12-Jane is asleep in her bed. Suddenly a rustling noise wakes her up. She gets up but can't see what is making the noise because it is still dark. Jane looks out into the hallway and sees a black, furry thing.

13-Jane is walking to school. On the way, Jane's stomach suddenly starts to hurt and she feels a bit dizzy.

14-Jane and her mum are in a big shopping centre. Jane looks around and sees that the shopping centre is full of people. Suddenly, she realises that she can't see her mum anymore because there are so many other people around.

15-Jane is going on an airplane to see her aunt who lives in another city. Jane gets on the airplane and takes her seat. As Jane sits down in her seat she suddenly gets a funny feeling in her stomach and she notices her heart is beating fast.

Coding Scheme and Instructions

Reliability coders were given the following instructions and coding examples: Negative interpretations involve expecting a threatening or negative outcome. Most of the responses given by children are straightforward to code but examples are given in the coding scheme for responses that you may be unsure about. You will also notice that there are reoccurring responses given. Code the response zero if there is no indication that a threatening or negative outcome will occur, the child provides some kind of benign interpretation, or even suggests that something good might happen. Code the response one if there is an expectation of a threatening or negative outcome in the situation or there is a strong implication that something bad will happen. Examples include the story character getting hurt in some way – this can be physical or social/interpersonal. This can also include the story character experiencing negative or anxious affect, such as feeling scared, worried, or sad.

For behavioural plans, code responses based on whether they reflect either an anxious/avoidant action plan or approach-centred action plan. Code the response zero if it is a non-anxious/avoidant plan or if it demonstrates approach behaviour, coping, or problem solving. This does not include seeking adult assistance to avoid dealing with the situation. Code the response one if it is an anxious/avoidant plan of action that may involve escape, running away, hiding, or stopping the activity they were doing. These plans may also involve seeking reassurance, seeking help from an adult, being vigilant to threat, and also includes any response that implies that the child would be overwhelmed with emotions.

Story #	Benign	Negative	Approach	Anxious/Avoid
Scored	0	1	0	1
1	keep biking, keep going including closer to the footpath/side of road, move over, go on footpath (does not specify something bad happen), pull over, get off bike, get out of the way	get run over, fall off, truck driver yells, drop something, gets hit, hurt, to be safe	carry on, move closer to path/to the side, keep pedalling/going, move over	swerve, yell, pull over or stop, move ONTO the footpath (shows avoidance to greater extent than simply moving over), driveway, get out of the way
2	go to the principal, office, ask someone, be fine after a while, walk around, find a friend	get lost, feel sick/throw up, back away a bit, cry	go to the office/principal/admin, try to make friends, find the room, explore, walk in, make friends	be sick, throw up, nervous, scared
3	try work it out, problem solve, skip and come back, write an answer, leave it blank (as not specifying that something bad is going to happen), skip, someone will help him)	might get it wrong, get stuck won't be able to finish test, tell the teacher he doesn't know any of the answers	skip and come back, strategy, problem solve, guess	worried, try to reassure self, leave it blank (rather than finding a solution), raise my hand, ask for help
4	make dinner, go to bed, read book, party, you're in charge, be responsible, someone will knock on door (excluding if followed by hides) have a party (exlc. if gets in trouble)	burglar, hide, call parents, kidnap, get scared, want to go with mum and dad, gets in trouble, do something bad/naughty (excl. if minor e.g. take lollies/watch tv), mess up the house/break stuff check windows and doors shut	stay up late and watch tv, eat dinner, do what I want, wouldn't mind, turn the light on go downstairs	hide, ask to go with them, don't want to stay by myself, worried, vigilant
5	stay with friend, just go inside, ask friends parents to phone them (not specifying something bad will happen)	might not come back, call the police, lock all the doors, run after them	just go inside, ask the friends parents (excluding asking to phone them)	run after them, wanting to know, wait for them, phone the parent (demonstrates reassurance seeking, what you might see in sep anxiety)
6	go to sleep, watch t.v., call parent, it might have just been the neighbours	scared, hurt, not go to sleep knowing, hear something in the night and get scared	go to sleep, go on computer, forget they've gone	pretend they're still there, ring them, try to sleep but unable to
7	start the speech, keep going, the teacher will shout at them	red in the face, cry, upset, stop the speech (exlc. If waiting for the class to stop laughing), run off, they're not being nice,	keep going, wouldn't care, ignore them, ask what they're laughing at	walk off, sit down, stop the speech, yell at them (loss of emotion regulation)

8	ask to play, join in, they're laughing at something else, run off, walk away, change mind (excl. if say that was a bad decision), ask why they're laughing, try to ignore them	might be laughing at her, bully her	ask to play, stick up for someone else being laughed at, ask what they're laughing at	tell the teacher, run away, walk off, wouldn't play, find someone else to play with, try to figure out what they're laughing at hopefully not me (staying vigilant)
9	show up, keep waiting, surprise him, ring and say they're late, ask his parents	no one will show up, nobody likes her, they haven't got time for the party, be alone, they've forgotten	ask mum and dad excluding asking them to phone or accompanied negative emotion, play with balloons, phone them excluding asking parents to	sad, ask mum and dad to phone them
10	keep walking, stop and wait for it to leave, stop and look at it, run away, (exlc. If dog chasing him)	attack him, chase him, barking at him, charge at him	keep walking, return it to its owner, stand still and wait, go to school, stay calm	back away, run away
11	get down again, climb down (excluding if breaks arm/leg doing it/if fire engine comes), call/shout help, wait for parents	Falls (exlc. If someone catches him), tree snaps, breaks arm, scream/cry for help, fire brigade comes	get down or try to get down (if mentioned anywhere), look for foothold, keep going	shout, call for help, wait for help, not look down
12	investigate, it's a cat or other benign object, turn on light or get a torch, go closer, go to her mum and dad, tells her parents, say who's there?	scream, hide, call the police, run, it will go to him and scares him	turn light on, get a torch (excluding if answer involves telling parents), see what it is, go back to bed, try to get it out	tell parents, shout (if anywhere), hide, lock my door
13	keep walking, go to school, or go home (without mention of being sick/sore), have food/drink, tell someone (without sick)	(any mention of) fall, throw up, be sick, doctor, tell someone I'm sick, sit down, faint, go to the school nurse	go to school, get a drink, go home (excluding if mention of being sick or unwell), see how I feel	call for help, cry, tell someone feeling sick/unwell (excluding 'not right'), mum/dad to pick me up, go to toilet
14	mum will spot her, go to meeting point, keep looking (unless accompanied by negative emotion), try to find her	screaming, calling mum, feel lost, worried, any answer that says 'help', can't find my mum, put it on the loudspeaker (assumption of being lost)	keep looking, look for her, keep waiting, look for signs	any answer that says help, say I can't find my mum, get it on the loudspeaker, get adult to help me
15	keep going, relax	sick, worried, faint, help, tell steward/ess, fears of being by self/alone, sore, toilet, get off the plane	wait it out, keep going, stay confident, take my mind off it	get barf bag ready, any answer with help/help me, tell steward/ess, ask parents to come with me

Appendix B

Ambiguous Information about a Novel Animal that was Read Aloud to Children in Study 1

Ambiguous Information

The animal that they heard about was counterbalanced so that some children heard information about a Cuscus and some children heard information about a Quokka. The following ambiguous information was read aloud to children in Study 1:

Cuscuses come from Australia; they have white shiny teeth, scruffy fur and big black eyes that watch you. Cuscuses have long sharp claws that they use to dig and scratch. They also have a very unusual smell and make strange noises.

Cuscuses live in dark places and they can be hard to see. They like to be by themselves and their nests can be very messy. Other animals keep away from Cuscuses.

Cuscuses are nocturnal animals which means they sleep during the day and creep out at night. Cuscuses can jump quite high and move very quickly. They are so quiet and fast when they move that you can't hear them even when they are very close to you. If you go to the woods and see a Cuscus hiding there, you never know what it might do.

Cuscuses feed on all sorts of things. They eat quickly, greedily and gulp down their food. They get very thirsty when they eat and so they drink whatever they can.

From: Field, Z. C., & Field, A. P. (2013). How trait anxiety, interpretation bias and memory affect acquired fear in children learning about new animals. *Emotion*, 13(3), 409.

doi:10.1037/a0031147

Appendix C

Interview Used to Assess Children's Interpretation Bias and Memories for the Ambiguous Information about a Novel Animal in Study 1

1) Memory Prompt: what can you remember about how a Cuscus looks?

- (a) Cuscuses have long sharp claws that they use to scratch. What do you think they scratch?

Which of these do you think is the most likely?

They scratch humans and other animals OR

They scratch trees

- (b) Cuscuses have big black eyes that watch you, why do you think they watch you?

Which of these do you think is most likely?

They are waiting to attack you OR

They are scared of you

- (c) Cuscuses have an unusual smell, what do you think they smell of?

Which of these do you think is most likely?

They smell disgusting like rotten egg OR

They smell fresh a bit like strawberries and flowers

- (d) Cuscuses make strange noises, what sort of noises do you think they make?

Which of these do you think is most likely?

They make frightening growling noises OR

They make purring noises like a cat

- (e) Cuscuses have scruffy fur, why do you think they have scruffy fur?

Which of these do you think is most likely?

They are dirty and have fleas OR

They like to play in the leaves and their fur gets messy

2) Memory Prompt: what can you remember about where a Cuscus lives?

- (a) Cuscuses live in dark places and they are difficult to see, why do you think they live in dark places?

Which of these do you think is most likely?

The dark keeps them safe from other animals OR

The dark makes it easier for them to creep up and attack other animals and humans

- (b) Other animals keep away from Cuscuses. Why do you think that is?

Which of these do you think is most likely?

Other animals know that Cuscuses prefer to be on their own so they just leave them in peace
OR

Other animals are scared of Cuscuses because they can be dangerous

(c) Cuscuses nests can be very messy, why do you think their nests are messy?

Which of these do you think is most likely?

Their nests are full of rotten animal bones that the Cuscuses have killed and eaten OR

Their nests are made from hay and leaves that get blown about in the wind

3) Memory Prompt: what can you remember about how a Cuscus behaves?

(a) Cuscuses are so quiet and fast when they move that you can't hear them even when they are very close to you. Why do you think they are so fast and quiet?

Which of these do you think is most likely?

They do not want to disturb other animals in the wood because they are shy and nervous OR

They attack other animals and humans and so do not want to be heard

(b) If you go to the woods and see a Cuscus hiding there, you never know what it might do but what do you think it might do?

Which of these do you think is most likely?

They would jump up and attack you OR

They would hide in the bushes because they are shy and scared of humans

(c) Cuscuses are nocturnal animals which means they sleep during the day and creep out at night, why do you think they creep out at night?

Which of these do you think is most likely?

Because it is cooler at night OR

Because most animals are sleeping, so it is easier for Cuscuses to attack them

4) Memory Prompt: what can you remember about what a Cuscus eats and drinks?

(a) Cuscuses eat all sorts of things, what sorts of things do you think they eat?

Which of these do you think is most likely?

They eat berries OR

They eat raw meat

(b) Cuscuses eat quickly, greedily and gulp down their food. Why do you think they eat like this?

Which of these do you think is most likely?

They are vicious carnivores OR

They don't want to be attacked while they eat

(c) Cuscuses get very thirsty when they eat and so they drink whatever they can, what do you think they like to drink?

Which of these do you think is most likely?

They drink water OR

They drink blood

(d) Cuscuses like to be by themselves, why do you think they like to be by themselves?

Which of these do you think is the most likely?

They are nasty and do not like other animals OR

They are shy and nervous of other animals

Appendix D

Coding Scheme Used to Assess Children's Memories in Study 1

Coding Scheme and Instructions

Code each statement that a child made according to whether the statement accurately reflects the ambiguous information, whether it is recalled in a more benign manner, or whether is recalled in a more negative manner. Statements that do not fit into these categories and appear to random embellishments are coded as irrelevant memories. The coding scheme contains a limited number of examples; use discretion and examples to decide when you are unsure. Do not code physical attributes that they have labelled from the picture, for example, "it had caramel coloured fur and a tail". Do not code items where it seems the child is just listing off body parts that any animal would have, for example, "a tummy, legs". Don't code "nature reserves" for where they live.

	None	Accurate	Benign Memory	Negative	Irrelevant
Cuscuses come from Australia					
1	Come from Australia	live in, come from, in Australia			
They have white shiny teeth					
2	White	white			
3	Shiny			sharp, big	
4	Teeth			bite you (override teeth)	
Scruffy Fur					
5	Scruffy	messy, furry skin			short
6	Fur	furry	fluffy hair	coarse hair	
and big black eyes that watch you					
7	big		small	scary	big beak or mouth
8	black	dark		very black, dark black, white	
9	eyes		shiny eyes	beady eyes	
10	watch you	look, sees	interested in new things	stare at you	protective of it's nest
Cuscuses have long sharp claws that they use to dig and scratch					
11	long			big	
12	sharp			very sharp	
13	claws		nails	razor claws	
14	dig		foraging		dig something else
15	scratch		trees	attack, scratch animals that come near, hurt people, scratch you	

They also have a very unusual smell					
16	very unusual	funny, strange, weird			
17	smell				
and make strange noises					
18	strange	weird			
19	noises			loud	uses its defenses
Cuscuses live in dark places and they can be hard to see					
20	live in dark places		Sunny, burrows, under logs	cave	bush animals, backyards
21	hard to see	hard to spot, people don't see them much			Find it hard to see
	They like to be by themselves				
22	like to be by themselves	stay, live by themselves/alone/avoids people, solitary	they're independent, afraid of other animals		
and their nests can be very messy					
23	nests	homemade nests			underground nests, small places
24	very messy			scrappy, they are messy, dirty	
	Other animals keep away from Cuscuses				
25	animals keep away			fierce, dangerous, doesn't like other animals, hostile when things get near it, territorial, mean, are scared of	if people be nice it will be nice
Cuscuses are nocturnal animals which means they sleep during the day					
26	nocturnal			hunt at night, vicious	night vision,
27	sleep during the day	in the morning, doesn't come out during the day		really bad pets	
and creep out at night					
28	creep out		come out, wander off, go out	like a predator, hunt out at	
29	at night				
Cuscuses can jump quite high					
30	jump quite high		really good jumpers	wild and jumpy	climb
and move very quickly					
31	move very quickly	walk/run quick		sneak, stealthy	
They are so quiet and fast when they move					

32	quiet	without noise, silent	light on their feet		
33	fast				
that you can't hear them, even when they are very close to you					
34	can't hear them			sneaks up on prey, can't see or hear it	
35	when they are very close to you	if you're next to one			
If you go to the woods and see a Cuscus hiding there					
36	woods	bushes, forests, undergrowth, trees		dark trees	live on the ground, on land, outback, nature reserves
37	hiding			Camouflage, hides in the dark	
you never know what it might do					
38	never know what it might do	don't know, can't predict	cheeky	might or might not be friendly/ attack you, scary, angry , attack other animals, naughty (override other attributes) strangely, doesn't behave well, scares you, do to you	
Cuscuses feed on all sorts of things					
39	feed	feed/eat (when combined with 40 in accurate box)		killed, bite (override feed/eat), anything smaller or a bit bigger, catch	
40	all sorts of things	eats anything, whatever it can find, alot	berries, leaves, grubs	animals, humans, meat (overrides other types of food), flesh, bones, their prey	keeps food in its nest, small insects
They eat quickly, greedily					
41	eat quickly	fast		hungrily, messily, noisily	
42	greedily			all the time, leave scraps of bones, gluttonous	
and gulp down their food					
43	gulp down		swallow it	gobble up	
44	food				
	They get very thirsty when they eat				
45	very thirsty when they eat	after they eat, thirsty easily, drink fast, when they are thirsty			
and so they drink whatever they can					
46	drink				
47	whatever they can	drink anything, any kind, alot		dirty water, blood (overrides water)	water

Appendix E

Coding Scheme Used to Assess Interpretation Bias for the Novel Animal in Study 1

Coding Scheme and Instructions

Reliability coders were given the following coding scheme and instructions:

Code each open response a zero if the child gives a benign interpretation. Benign responses are those that imply the animal is not-threatening and potentially even friendly.

Code the response one if the child gives a negative interpretation. Negative interpretations imply that the animal is threatening in some way, including to other animals and humans.

This also includes responses which imply that the animal is dirty or disgusting. Give a score of one if a negative interpretation is present, even if a benign interpretation is also mentioned.

Question	Excel column	benign	negative
Clawsopen	b	trees,bark, dirt	animals, humans, prey, bones, predators
BlackEyesopen	d	to see if you're gonna hurt them, to keep their territory	might attack you
Smellopen	f	stuff they eat	dirt, mouldy bread, skunk, rotten, meat
Noiseopen	h	platypus, weird sound, unusual, squeaking, ostrich, goat, guinea pig	screech, hiss, like bats, owls, possum, bark, grunt
Scruffyopen	j	don't have brushes, when someone touches them	don't bother to wash, not clean, get in a lot of mess, hunt, fight, attacks, dirty, hurt people
Darkopen	l	don't want to be seen	creep up, like to be in a cave
KeepAwayopen	n	jealous of its fur, none adapted to the habitat	noises and smells, big claws, territorial, afraid of them, long claws and stares, scared of it
Nestopen	p	aren't very tidy, run around alot	drag prey in there, aren't clean animals, get in fights
Quietopen	r	to escape predators	sly, attack, creep up, to get prey

Hidingopen	t	just watch you	hiss
Nocturnalo pen	v	nocturnal, some others aren't nocturnal, looking for predators	attack, hunting, catch prey
Eatopen	x	anything, small animals e.g., rats, mice, insects	animals (without small), foxes, quokkas/cuscuses, bones, human
Greedilyope n	z	other animals come along, get another lot, just greedy	to see if something else they can attack quickly
DrinkOpen	ac	water	blood
Themselves open	ad	solitary, peaceful, so they can rest	don't like other animals, don't like to share, greedy, surprise animals to eat them, ready to attack, don't trust others

Appendix F

Vignettes and Interpretations that Children Heard and were Asked to Recall in Study 2

Children heard the following vignettes and either a negative or a benign interpretation depending on their experimental condition:

The Dog

Jane has just got home from school. Jane gets a call from her friend who asks her to come over and play. Jane decides to walk to her friend's house and tells her mum where she is going. Jane waves goodbye to her mum as she walks off down the road. As Jane gets closer to her friend's house she hears a dog barking. Suddenly a big dog appears from a driveway. The dog stops and looks at Jane.

NEGATIVE-The dog looks mean. It might try to bite me.

BENIGN-The dog looks friendly. I'm going to pat it.

Late for School

Jane wakes up late for school one morning. Her parents tell her it is time to leave but she isn't ready to go. Jane rushes about getting dressed and getting her schoolbag ready. She runs out the door and down the road towards school. On the way to school Jane feels funny and notices she is sweating.

NEGATIVE- I think I'm going to be sick. I should go home and get mum or dad to call the doctor.

BENIGN- I forgot to have breakfast. I should eat some of my yummy lunch when I get to school.

Climbing the Tree

One day after school Jane goes to the park. Jane tells her parents where she is going and walks to the park by herself. When Jane gets to the park she sees a big tree and decides to climb it. Jane reaches the top of the tree. At the top of the tree Jane looks down. Jane has climbed a long way up and is very high off the ground. As she looks around Jane feels surprised.

NEGATIVE-Oh no! I might fall and break my arm.

BENIGN-Wow! It's a great view from up here.

First Day at a New School

It is Jane's first day at a new school. Jane's mum drops her off at the school gate and waves goodbye. Jane looks around and sees lots of other children that she doesn't know. Jane then looks around for her classroom. She hears the bell ring and sees the other children go to their classrooms. Jane starts to get a funny feeling in her stomach.

NEGATIVE – I'm lost and can't find my classroom. I'm scared to meet my new classmates!

BENIGN-I'll go ask an adult where my classroom is. I'm excited to meet my new classmates!

The Math Test

Jane is in class at school. At the start of class her teacher tells everyone that they are going to be tested on some math problems today. The teacher hands out the tests and tells the class to begin solving the math problems. Jane didn't know that there was going to be a maths test today. Jane looks at the first question and feels surprised.

NEGATIVE-These questions look really hard. I'm won't know how to answer any of them!

BENIGN-These questions look really easy. I know how to answer all of these!

Reading a Story

Jane and her classmates have been writing their own stories. Today at school Jane has to read her story out loud to her classmates. Everyone is seated in the classroom and the teacher asks Jane to come to the front. She walks to the front of the class. Everyone is looking as Jane begins to read her story. As she is reading her classmates start to laugh.

NEGATIVE-Everyone is laughing because they think my story is really silly.

BENIGN-Everyone is laughing because they think my story is really funny.

Home Alone

Jane's mum and dad have movie tickets. They are going to go watch the movie after dinner. Jane's mum and dad leave to go to the movies. Her parents say that she is old enough to stay home alone that night. Jane has never stayed home alone before. Jane watches as her parents drive away.

NEGATIVE-I'm scared. Someone might try to break into the house.

BENIGN-I'm excited. I'm going to stay up all night and eat ice-cream.

At the Shopping Centre

Jane and her mum are in a big shopping centre. Jane looks around and sees that the shopping centre is full of people. Jane stops to look in the window of a toy store. A moment later Jane realises that she can't see her mum anymore because there are so many other people around.

NEGATIVE- I'm lost! Something bad might happen, I better scream out for help.

BENIGN-This is great! Now I can go into my favourite toy store and look around.

Appendix G

Coding Scheme Used for Children's Recall of the Vignettes in Study 2

Coding Scheme and Instructions

Notice that in the coding scheme each story is broken down into several parts, and each part is located in a separate box. A child can receive a total of 1-point per box for correct statements, and they can receive a point for saying anything mentioned in the box – they do not have to recall every piece of information within the box. Sometimes children introduce information that was not reported in any of the stories. These bits of information get coded as ‘irrelevant’ and the child receives one point per irrelevant statement. Sometimes children introduce ideas/statements from a different story and these pieces of information also get coded as ‘irrelevant’. Negative and benign recall get coded as one point for each negative or benign statement that they introduce into their story recall. So for example, if a child said “he felt sick and he was anxious about making new friends” this would receive 2-points as it represents two ideas/statements, albeit both negative. If a child recalls a correct statement/idea and there is a negative/benign statement attached to this then in general they would receive one point for each category (i.e., one point for correct and also one point for negative/benign) – but see the coding scheme for specific instances. The coding scheme only contains examples and discretion must be used.

First Day at a New School	Correct	Irrelevant	No Point
It is Jane's first day at a new school. Janes mum drops her off at the school gate and waves goodbye	<i>New</i> school (can't be just school) unless more detail e.g. first day at a school, walked up to the gate	He walks to school, she watched her mum go, he was late for school	He goes inside (with no other details)
Jane looks around and sees lots of other children she doesn't know	Looks around she didn't know anyone (if preceded or followed by sweating/ scared then gets coded negative), saw new children		
Jane then looks around for her classroom	He was looking around, wonders where her new class will be, trying to find his classroom		
She hears the bell ring and sees the other children go to their classrooms	Rushing to their classrooms, john was outside for a little while, kids were getting ready to go to class, didn't know where he could go, can't find his new classroom, doesn't know where her classroom is	She went and sat in her class, she went into her class, goes to his new classes	
Jane starts to get a funny feeling in her stomach	Strange feeling, odd feeling	Jane thought oh where's the teacher, feels confused	
Negative	Benign		

Felt sick, wasn't confident, nervous, anxious, he doesn't want to go, they might tease him, scared, he got lost, doesn't feel good	I'll go ask a teacher where my classroom is, I can't wait to meet my new classmates, he was asking people what their names were		
Math Test	Correct	Irrelevant	No Point
Jane is in class at school. At the start of class her teacher tells everyone that they are going to be tested on some math problems today	Jane went to school, at school, got to school, got into her classroom, they were having a math test that day, going to do a math test in class, in the morning they were going to do a math test	The bell rang and he sat down at his desk, tell everyone to sit at their desk, he went to his new classroom	
The teacher hands out the tests and tells the class to begin solving the math problems	Gets given a math test, the teacher said ready go, put the paper in front of her, write down the answers, he got handed it, everybody got the test, he was writing a test	teacher wrote down the first question, teacher gave him a pen	
Jane didn't know there was going to be a math test today	Didn't expect one, didn't realise, he realized he was having a math test,	She didn't know what happened, wasn't organised	
Jane looks at the first question and feels surprised	Look at the first question and thinks, looks down and sees all the questions, saw the math test (Get 1 for Correct and 1 for Negative if have scared OR surprised	confused	
Negative	Benign		
They were hard questions, won't know how to answer them, scared to get them wrong, she's going oh no, he didn't know the answer, started to worry, felt nervous, didn't feel good	Found it easy, it was easy, he was excited, she liked maths, he did all the math test		
Reading A Story	Correct	Irrelevant	No Point
Jane and her classmates have been writing their own stories. Today at school Jane has to read her story out loud to her classmates.	Acceptable to have reading a story/books, it was her turn to share her story, read out loud to the whole class, they had to share their stories with the class	The bell rung and he's at his desk, they read a story together	
Everyone is seated in the classroom and the teacher asks Jane to come to the front. She walks to the front of the class.	John was called up, she got up in front of the class, she went up, everyone sits on the mat, she got brought up first, they all sat down at their desk, she got up		
Everyone is looking as Jane begins to read her story. As she is reading her classmates start to laugh.	Reading a book out loud and they started to laugh, all the kids were watching	He was trying his best to read his story	
Negative	Benign		
Laughing at her, <i>laughing</i> because his story was silly/dumb, she was shy, didn't want to read it, she was scared, her friends were going to make fun of her	Reading a story that made everyone laugh, laughed because they thought the story was funny		

Home Alone	Correct	Irrelevant	No Point
Jane's mum and dad have movie tickets.	Got given movie tickets, mentions after dinner, going that night		
They are going to watch the movie after dinner.	They were gonna leave her home alone, his parents set off, went to go see the movie		
Her parents say she is old enough to stay home alone that night. Jane has never stayed home alone before.	Let her be home alone, old enough to look after the house alone, it was her first time, it was new to her, (spoiled if it says she's scared because of this, but must have because), stayed home alone, by himself at home		
Jane's mum and dad leave to go to the movie. Jane watches as her parents drive away	Looked at the car, stood outside, went to go see the movie	The mum and dad came back home and said he could watch a movie after dinner, stood on the driveway, he had a feeling in his tummy, waved goodbye	
Negative	Benign		
Worries someone /burglars might break in/ steal his stuff, scared, didn't feel good, felt sad, didn't want them to go, weird feeling, kidnap, didn't know what to do	Stay up all night and eat ice cream, excited		
The Dog	Correct	Irrelevant	No Point
Jane had just got home from school. Jane gets a call from her friend who asks her to come over and play.	Got home from being out, after school, she was walking home, the friend said she was allowed to come, sleepover	His friend loved to play over, she was at the park	
Jane decides to walk to her friend's house and tells her mum where she is going. Jane waves goodbye to her mum as she walks off down the road	Tells his mum, walks to his friend's house by himself, Waves goodbye, said goodbye, started walking down, Walking across the road to his friend's house,	He's going to the shops, he goes and plays, her mum takes her to her friend's house	He was going for a walk (with no detail to where)
As Jane gets closer to her friend's house she hears a dog barking.	Sees a dog barking, must mention barking/hearing a dog, as he went down to his friend's house		Negative point if barking at him
Suddenly a big dog appears from a driveway. The dog stops and looks at Jane	On the way there was a dog, a dog comes out, it came onto the street, he found a dog, came out of the gate, leaped onto the footpath	A dog came out of the window, the dog came by a carpark, a bigger dog appeared	Come out of the thing (no detail about where it came from)
Negative	Benign		
Looks mean, might bite him, she gets scared/he didn't feel safe, doesn't like dogs, it's about to eat him, dog barking <i>at</i> him, look at her viciously, growling	Pat it, looks friendly/nice, she wasn't afraid, playing with him		
Late for School	Correct	Irrelevant	No Point

Jane wakes up late for school one morning. Her parents tell her it is time to leave but she isn't ready to go	Woke up, woke up late, jane was in bed, late for school, her parents told her to get out the door, his parents woke him up and told him he was late, finds out she's late for school	Woke up when her alarm went off, when her parent leave she is prepared	His mum said something (not enough detail about what said)
Jane rushes about getting dressed and getting her school bag ready	She got ready, he had to get everything ready and leave, put his clothes on, it was crazy getting all his clothes on and stuff, packs his lunch and stuff, didn't have enough time to get ready	He doesn't even bother getting all his clothes on, packing her bag with lunch	
She runs out the door and down the road towards school	Ran to school, raced off, he went to school, started to walk to school, left for school, goes off to school, hurried and ran	in the car	Went outside, she had to go (no detail as to where or running)
On the way to school Jane feels funny and notices she is sweating	Get a point for sweating (and extra point for negative if feeling sick), started to go to school and he was sweating, felt weird	Her stomach starts sweating, go call the dentist	Still get a point for saying sweating
Negative	Benign		
Going to be sick, should go home and tell mum or dad, call doctor stomach pains, worried, didn't want to go to school, tummy didn't feel good, afraid to be late	Didn't have breakfast gonna have some of my yummy lunch, she was hungry, eat lunch at school		
Climbing the Tree	Correct	Irrelevant	No point
One day after school Jane goes to the park. Jane tells her parents where she is going and walks to the park by herself.	After school, jane wanted to go to the park, was walking home from school, he was going to the park, Jane went for a walk,	Started running towards the park, go with his friends, waved/said goodbye	
When Jane gets to the park she sees a big tree and decides to climb it. Jane reaches the top of the tree.	She was climbing a tree	There was no one at the park	
At the top of the tree Jane looks down		There was something	
Jane has climbed a long way up and is very high off the ground.	This tree is so long, look for high, so far up		
As she looks around Jane feels surprised.	Surprised		
Negative	Benign		
break arm, branch might break gets scared, can't get down	Nice view, realised I can see everything, started to get a good feeling through her		
Shopping Centre	Correct	Irrelevant	No Point
Jane and her mum are in a big shopping centre.	Okay to say supermarket		
Jane looks around and sees that the shopping centre is full of people.	It was crowded		
Jane stops to look in the window of a toy store.	Too busy looking at the toys, saw a toy store, look in her favourite	John was waiting for his mum, cos he wanted some	

	toy store (unless it is keeps on looking after mum is gone)	toys, trying to find his mum	
A moment later Jane realises that she can't see her mum anymore because there are so many other people around.	She realized her mum was gone, she lost her mum, his mum left/carried on	She was gonna try find her mum, trying to look for his mum	
Negative	Benign		
cry/scream for help/because he might get lost felt sad, worried, scared, didn't know what to do	Felt excited, that's great now I can go to the toy store, go to the toy shop all by herself, he thought it was cool, really wanted to go to his favourite toy shop		

Appendix H

Ambiguous Vignettes and Instructions for Study 3

Instructions and Vignettes

Below are the instructions and vignettes that were given to the researcher in order to administer the Ambiguous Vignettes Paradigm:

General Rules

- Repeat stories if asked or if participant has trouble answering
- Use non-directive prompts such as “mhmm, uh-huh” until the child seems as though they have finished, no leading questions

Reading the Vignettes

- Read the vignette out loud
- First ask the open question e.g. “*What do you think has happened to your book?*” and wait for participant to finish responding
- Next ask the forced choice question and the options in a random order, repeat if necessary and make sure the participant has heard all of the options
- After participant has selected their response, read the final question for that vignette

Read the following to introduce the task:

“I am going to tell you about some situations that you might find yourself in and ask you what you would think about them. For some of these situations you might have to imagine what it would be like while others you might have already experienced or been in. The important thing is that you tell me what you would really think in that situation. If you don’t understand something or you want me to say something again, just let me know. Does that sound okay? Alright lets start”

1. You notice one day that a favourite book of yours is missing. Later you notice a boy in your class has a similar book in their bag.

What do you think has happened to your book?

Which do you think is the most likely?

That student has stolen the book and put it in their bag.

Someone who doesn’t like you has taken your book so you will be in trouble with your parents.

You left your book at home.

A friend borrowed the book thinking you wouldn’t mind.

What would you do if that happened to you?

2. You see the School Principal walking around the school at lunchtime and she has been asking other students where you are.

Why do you think the school principal is looking for you?

Which do you think is the most likely?

She has a message for you

The Principal thinks you have done something wrong and is angry

She wants to tell you she had noticed you are working harder and that she is pleased

One of the other children had told the teachers something bad about you

What would you do if that happened to you?

3. You are sleeping over at a friend's place and his/her parents seem to be really annoyed and cranky all the time.

Why do you think your friend's parents are annoyed and cranky all the time?

Which do you think is the most likely?

They had a little argument and are a bit upset with each other

They don't really like you

They think you have done something wrong

They had a party last night and they are tired and don't feel well

What would you do if that happened to you?

4. You see a group of students from another class playing a great game. You walk over and want to join in. You hear them laughing.

Why do you think they are laughing?

Which do you think is the most likely?

They are going to start looking at you and telling secrets about you

They will soon ask you to join in

One of them is likely to rush up and push you away

They are going to notice you and smile

What would you do if that happened to you?

5. You arrange to have a party at 4pm and by 4.30 no one has arrived

Why do you think no one has arrived?

Which do you think is the most likely?

Your friends are angry at you and don't want to come

You must have put 4.30 on the invitation

They are late because the traffic is very heavy

They don't want to come because they think it will be really boring

What would you do if that happened to you?

6. You are showing your school project in front of the class and two students up the back are giggling.

Why do you think they are giggling?

Which do you think is the most likely?

They think the project is really dumb
They are being silly
Another kid is making funny faces at them
There is a big stain on your clothes and they are laughing at you

What would you do if that happened to you?

7. On the way to school you start to feel funny in your stomach.
Why do you think you feel funny in your stomach?

Which do you think is the most likely?

There is something wrong with your stomach and you will need a really big operation
You ate some bad food and are going to be really sick at school
You didn't have enough breakfast and should have a bit of your school lunch when you get to school
It is okay and it will go away soon

What would you do if that happened to you?

8. You are in the middle of a class and are called to have a health check.
Why do you think you have been called to have a health check?

Which do you think is the most likely?

It's only a nurse checking your weight and how tall you are
It is because the teacher thinks you are really sick
Everybody in class is having a health check
The students who have problems have been picked to have health checks

What would you do if that happened to you?

Appendix I

Coding Schemes for the Ambiguous Vignettes Paradigm in Study 3

Instructions and Coding Schemes

For the first open-ended response to each story, code for whether it is a negative interpretation or a benign interpretation. Negative interpretations involve harm to self, negative affect, potential threat, hostile intent of others, or bad or catastrophic outcomes. Benign interpretations imply the situation is benign rather than threatening, safe, or that there may be a good outcome. Score one point if it is a negative interpretation or zero points if it is a benign interpretation. For the second open-ended response for each story, code for whether it is an anxious/avoidant response or a non-anxious/approach response. Anxious/avoidant responses (score 1) include escape from situation, hiding, seeking reassurance or protection (e.g., from an adult), or experiencing negative affect (e.g., embarrassment, fear, worry). Code the response zero if it is a non-anxious/avoidant plan or if it demonstrates approach behaviour, responses that imply the situation was manageable, or problem solving. Exemplars for the adolescent's responses are given in the first table, and exemplars for the mothers are given in the second table. Use discretion based on these responses for any that you are unsure of.

Adolescents' Responses			
Book			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
He has taken it, he has stolen it	He could have the same book, think about the situation more, he has borrowed it, I've lost it, I wouldn't make assumptions	Tell parents or teacher, let them use it, do nothing	Ask him, look at home, if I needed it I would apologise and say I'd forgotten it, wouldn't think about it, ask to share with someone
Principal			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
I'm in trouble	To ask me about something, wouldn't have a clue what would be going on, won't know until you ask	Wouldn't look for them, Non-anxious/Approach with caution (but also gets a point for Non-anxious/Approach), hide,	be proud of myself, try and think if I'd done something the principal would want to see me about, wonder what she would want
Parents			

Negative	Benign	Anxious/Avoid	Non-anxious/Approach
They're not happy I came over, we are being too loud	They're stressed, wouldn't have a clue, my friend doesn't listen to their parents, they don't get along	Keep my distance, Anxious/Avoid them, wouldn't go there, stay in friend's room, stay away from them/get out of their way	Ask my friend if they are okay, stay out of it, leave them alone, give them space, nothing
Game			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
Laughing at me, don't like me, think I can't play, don't want me to play, foot tripped someone	Laughing at a joke, having fun	Find somewhere else to go, wouldn't join in, leave	Join in, wouldn't think much about it, smile back
Party			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
Don't like me, didn't want to come, not coming, forgotten/forgot about me/didn't tell me	they are busy, just couldn't make it/have commitments, flaky	See if they don't want to be there, see if they're coming or not	Call them, don't think I'd take it seriously, wouldn't be bothered, wait until 430, just chill
Project			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
They're bored and don't want to listen, talking about me, boring and they're not interested, the work doesn't make sense, don't care about my presentation	Not paying attention, talking to each other, one of them did something funny, because it's funny, shared a joke	Get the teacher to get them to stop	Ignore them, start laughing too, ignore them and carry on, ask them to be quiet
Feel Funny			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
Nervous, hard subjects and long day, feeling sick	Just brush it off, ate something (without suggestion of being sick)	Go to the office, go home	Brush it off, eat food, if it gets worse tell someone, wait to see, nothing
Health			

Negative	Benign	Anxious/Avoid	Non-anxious/Approach
The teacher is concerned, bug going around	I signed up for it, just a regular check-up, they are checking everyone, wouldn't know/no clue, wonder why	Try to figure out if its good or bad, find out if it's just me, get nervous and worried	Wouldn't mind, just go along, ask them what they're gonna do, ask why

Mothers' Responses			
Book			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
Be upset, someone has taken it, think it's his book	Find it interesting that he has the same book, I tell her to suspect gravity, someone has picked it up NOT assume that it was stolen	Ask parent what they should do, tell the teacher, feel bad, seeking guidance from parent, nothing she wouldn't say anything	look for it, ask the other child, gather information, ask if we had seen it, look at home
Principal			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
Worry, have a guilty conscience, done something wrong	Wonder why	Shaking in her boots, wait for the principal to find them, nervous	Go and ask/find the principal, go get an award, maybe I should go to the office
Parents			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
Be embarrassed, feel uncomfortable, wonder if it's something I've done, affect whether she wants to go there again	Wonder if they'd been fighting, don't know what's going on, something is stressing them	Ask if she should go home (a point for Non-anxious/Approach too if she asks if she should stay), stay in the room, stay out of the way, steer clear, keep away, wouldn't want to go there again	Ask her friend if she should stay, behave, give them space, stay out of it, tell me (the parent) about it
Game			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
It was something about her	Just having fun	Not confident to join, go and play her own game	Be happy, join if invited, wait for the invite
Party			

Negative	Benign	Anxious/Avoid	Non-anxious/Approach
They didn't think it was important, they have forgotten about her		Burst into tears, be distressed, she would feel sad I would feel the need to respond	Be calm, check it and make sure, watch out window
Project			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
At him/her, at her presentation, think it's boring, something more interesting than the project	Being clowns, at something they've said, don't think she would jump to conclusions it's about her	Be visibly upset, be affected by it, embarrassed, look for support from adult, start talking to the ground, nothing, tell the teacher	Keep going, finish the presentation, carry on
Feel Funny			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
Sick, ate something bad, anxious, nervous (get 2 points if name specific thing e.g. exam), not feeling well, somethings not agreeing with me	Needs to go toilet, eaten something weird (without mention of sick)	Tell me/text me, want to go home (must say this is what the child would do not know that they could contact parent to go home)	Carry on to school, eat some food
Health Check			
Negative	Benign	Anxious/Avoid	Non-anxious/Approach
Am I the only one, be anxious, embarrassed, nervous, only me, why am I being singled out, oh crap why me (insinuates its for a bad thing)	Everybody needs to do, just a random health check, be curious, wonder why, it's a bit odd	Negotiate her way out, be nervous, anxious	Be fine, go along and do it

Appendix J

Autonomy Restriction and Autonomy Support Coding Schemes for Study 3

Instructions and Coding Schemes

Code autonomy restriction first. Examples are given below and discretion should be used based on these exemplars. Some statements may fit under more than one of the overarching categories, however, only score it as one occurrence. Code the total number of instances of each of the following kinds of occurrences to give a total score for autonomy restriction:

Telling their adolescent what to do, say, feel, or ought to do.

- this can be in the present moment (i.e., during the conversation) or in the context of the past
- look for words such as force/ed, made/make, ought, should, have to, must, need to, had to
- excludes “tell me” when genuinely eliciting information from their adolescent
- can be from the adolescent’s perspective or from the mother’s perspective
- includes talking about an instance when they gave the adolescent a directive

Examples:

- “You should have been less cheeky in public”
- “You have to have an adult when you are swimming”
- “Then I said, you go outside and sort yourself out”
- “I told you that you have to listen to me”

In context of current situation

- “Put the phone away”
- “Stop drawing on your hand”

Invalidating or dismissing the adolescent’s perspective or point of view.

- can include being dismissive or disagreeing with their appraisal of the event, downplaying how they feel/felt about it, or changing the topic back to the parent’s own perspective

A: We have different values

M: I like to think it’s not values

A: I didn’t like it, that annoyed me

M: Yeah but you got out of it pretty quickly

Patronising the adolescent.

- using status, position of authority, or adolescent's age in service of an argument or to dismiss adolescent perspective
- suggesting that the adolescent is not mature enough to manage a certain situation

"I don't think you're emotionally mature enough to handle it"

"How old are you? 15?"

A: it's the tone of voice he uses, he acts like he has to be better than me

P: but I guess he is the elder one and you're the younger one

Intolerance to differences of opinion.

- parent word/point of view as final say
- saying an issue is not up for discussion, or negotiation, and that the parent decision is final
- appealing to 'rules' and that these are final
- the mother may coerce the adolescent to agree with their own perspective/point of view
- still counts if talking about a conflict that is currently ongoing

"Those are the rules, there we go it's me laying down the law"

"It has to be at a respectable hour and those are the rules"

Leading questions.

- questions that the parent expects/wants a particular answer or suggests there is only one 'right' answer
- most often used in service of eliciting information from adolescent that fits with parent's perspective and point of view
- Look at what question is doing in context; does the parent genuinely want to know the adolescent's opinion/point of view?
- Leading questions also include those that impose the parents point of view (similar to a rhetorical question), for example, by insinuating the adolescent was the cause of the conflict, blaming/shaming questions, questions that require the adolescent to 'explain themselves' or their actions

"What I want to know is why you had such an attitude at the skate park"

"You didn't really care, did you?"

“Do you think my opinion on your emotional maturity is valid?”

“Do you think it was sensible behaviour?”

“You’re not dumb, you can do it, and why don’t you do it?”

Use the following exemplars to code autonomy support separately:

Validations.

Validations serve to confirm and solidify the other participant’s contribution or the story told from the other participant’s point of view. This is usually in the form of the parent saying things like:

- yeah, yes that’s right, mmmm, I remember that, okay
- repeating the adolescent’s statement to confirm (doesn’t have to be exact wording)

A validation can also include saying 'no' but look at the function that it serves in the context of the previous contribution. If a parent repeats what their adolescent says it might appear to be a validation but look at the context that it is used in – does it validate the contribution of the other participant? Exclude reconfirmations, for example, a parent saying ‘yeah’ after the adolescent says ‘yeah’ as the adolescent hasn’t contributed anything to confirm or validate. Don’t count parent ‘yeah’ in response to interviewer, must be in response to the adolescent’s contribution.

Open questions.

Open questions usually require the other participant to generate further information, and will usually be posed as what/how questions. Closed questions almost always require a yes/no response or else the parent is asking the adolescent to confirm what the parent has just said. They can also be posed as forced choice questions.