Intergenerational transmission of anxiety: The influence of parental anxiety on child-related information processing biases

A thesis submitted to The University of Manchester for the degree of Doctor in Clinical Psychology in the Faculty of Medical and Human Sciences

2011

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Word count: 24,819
Abstract

This thesis examined the association between parental anxiety and child-related information processing biases. Paper 1 describes a review of the extant literature concerning information processing biases in anxious parents. Although the published research in this area was found to be limited and characterised by contradictory findings, both parental threat interpretation biases and biases in parental estimations, evaluations and expectancies were found to be associated with parental anxiety. Furthermore, evidence that these biases influence the processing of child-related information as well as self-referent information was identified. In addition to these findings, the review highlighted a number of weaknesses within the literature, specifically in relation to study design, methods of measurement and sample characteristics.

In order to address the limitations of existing measures of child-related parental threat interpretation, a more methodologically rigorous approach for assessing the interpretation of ambiguity was adapted for use with parents. As reported in Paper 2, fifty-four community-based parents with a child aged between two and eleven years participated in an experiment designed to measure whether state anxious parents interpret ambiguous situations involving their child as threatening. Results indicated no difference in patterns of interpretation between state anxious and non-state anxious parents. Methodological weaknesses associated with the study design prevented definitive conclusions regarding the existence of a child-related threat interpretation bias in anxious parents from being made.

In Paper 3, the approaches used within the current thesis are evaluated in terms of their strengths and weaknesses. Clinical implications of the findings are discussed and ideas for further research are outlined.
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Acknowledgments

I would like to thank my supervisors, Dr. Ben Laskey and Dr. Anja Wittkowski, for the guidance, support and patience they offered during the course of the study. I would also like to thank Julie Morris for her advice and assistance with the statistical analysis.

I am particularly grateful to all the parents who gave up their time to participate in the study and to those who kindly facilitated the recruitment process.

A special thanks to my family for their unwavering support and understanding over the last few years.
The impact of parental anxiety on threat interpretation and prospective cognition: A narrative review

Prepared in accordance with author guidelines for Clinical Psychology Review
(see Appendix 1)

Word count: 9618
Abstract

Models of intergenerational transmission of anxiety from parents to children suggest that parental anxiety is associated with information processing biases that extend to the processing of sources of potential threat within the child’s environment. This relationship is assumed to elicit behaviours from the parent that are associated with the development of child anxiety. This review paper examines the evidence that parental anxiety influences parental information processing. Parental anxiety was found to be associated with both parental threat interpretation and parental evaluations, estimations and expectancies. Furthermore, these biases appeared to be present when parents processed child-related information as well as self-referent information. Conclusions regarding the strength of this association are difficult to draw as a result of inconsistent findings and limitations within the extant literature. Explanations for contradictory findings are discussed and future research is suggested to address the identified limitations.

Keywords: Parent, Anxiety, Cognition, Interpretation, Expectation, Child

Highlights:
- Intergenerational transmission of anxiety could be mediated by parental information processing biases.
- Parental anxiety is hypothesised to be associated with parental information processing biases.
- Research into this relationship has provided mixed results, making it difficult to draw firm conclusions.
- Future research is required to address conflicting findings and methodological limitations.
1. Introduction

Anxiety disorders affect between 2.5% and 5% of the child and adolescent population at any given time (Rapee, Schniering & Hudson, 2009). Historically, child anxiety received little research attention as it was considered to be an inconsequential developmental phenomenon (Vasey & Dadds, 2001). More recently, it has become evident that childhood anxiety is associated with low self-esteem (Messer & Beidel, 1994), poor peer relations (Goodyer, Wright & Altham, 1990; Strauss, Frame & Forehand, 1987), impaired academic attainment (van Ameringen, Mancini & Farvolden, 2003; Wood, 2006) and adult anxiety disorders (Gregory et al., 2007; Otto et al., 2001; Pine, Cohen, Gurley, Brook & Ma, 1998). Furthermore, the societal cost of children with anxiety disorders is estimated to be 20 times greater than that of non-anxious children (Bodden, Dirksen & Bögels, 2008).

The notion that anxiety runs in families is well supported by evidence from family studies (Beidel & Turner, 1997; Cooper, Fearn, Willetts, Seabrook & Parkinson, 2006; Last, Hersen, Kazdin, Francis & Grubb, 1987; Last, Hersen, Kazdin, Orvaschel & Perrin, 1991; Merikangas, Dierker & Szatmari, 1998; Schreier, Wittchen, Hofler & Lieb, 2008; Turner, Beidel & Costello, 1987). A recent meta-analysis revealed that children of parents with a diagnosed anxiety disorder are twice as likely to develop an anxiety disorder as children of parents with other psychological disorders (e.g., depression, substance abuse) and nearly four times more likely to develop anxiety than children of parents without a diagnosed psychological disorder (Micco et al., 2009).

Although family studies have proved useful in identifying the tendency for anxiety disorders to aggregate in families, they have been unable to establish the nature of the mechanisms underpinning this association. By contrast, twin studies have helped disentangle the relative contribution of genetic influences and environmental factors in the transmission of anxiety (Gregory & Eley, 2007). Heritability estimates vary according to the age and sex composition of the sample, how anxiety is defined and whether anxiety is parent or child informed (Eley & Zavos, 2010); however, approximately one third of the variance in childhood anxiety is accounted for by genetic influences (Eley, 2001) with the remaining portion of the variance being attributed to environmental factors.
Given that 10% of adults are diagnosed with an anxiety disorder each year (Somers, Goldner, Waraich & Hsu, 2006) a substantial number of children are at elevated risk of developing anxiety. Parental anxiety is considered to be a risk factor which is not directly causal, but rather moderated or mediated by another mechanism (Donavan & Spence, 2000). Consequently, the intergenerational transmission of anxiety is an area that has received an increasing amount of research interest in the hope that further understanding of the processes involved will lead to improvements in treatment efficacy or preventative interventions. Despite this increased interest, exactly what is transmitted and how remains unclear.

Numerous factors have been implicated in the aetiology of childhood anxiety including attachment, inherited vulnerability, temperament, parenting, learning experiences, adverse life events and biased information processing (Bögels & Brechman-Toussaint, 2006; Murray, Creswell & Cooper, 2009; Rapee et al., 2009). In order to get a more complete understanding of the development of child anxiety, Vasey and Dadds (2001) advocated that, rather than examining risk factors in isolation from each other, a greater understanding of the dynamic, transactional relationships between the risk factors must be achieved. Consistent with this view, some theorists have hypothesised that the cognitions of anxious parents interact with their parenting behaviours to influence the development of anxious information processing biases in their children (e.g., Creswell, Cooper & Murray, 2010; Field & Cartwright-Hatton, personal communication; Hudson & Rapee, 2004; Muris & Field, 2008; Murray et al., 2009).

Information processing biases have been viewed as central to the development and maintenance of child anxiety disorders for more than two decades. In a downward extension of adult theories of anxiety (e.g., Beck, Emery & Greenberg, 1985), Kendall and colleagues (Kendall, 1985; Kendall & Ingram, 1987; Kendall & Ronan, 1990) proposed that anxious children possess threat and danger-related schemata which introduce bias into information processing. Biased information processing serves to maintain child anxiety by eliciting cognitive and behavioural responses which reinforce the threat schemata. Drawing on this model, Daleiden and Vasey (1997) elaborated on the nature of the distorted processing; hypothesising anxious children selectively attend to threatening information, interpret ambiguous information as threatening, demonstrate a negative attributional style, expect
negative outcomes and anticipate an inability to cope with anxiety and threatening situations.

There is a growing body of evidence to support the idea that anxious children process threat-related information in a biased fashion, although much of this research has focussed on the selective attention bias and the threat interpretation bias (see Muris & Field, 2008, for a review). This has led researchers to question the origins of these processing biases. Using a family discussion paradigm, Barrett and colleagues (Barrett, Rapee, Dadds & Ryan, 1996; Dadds, Barrett, Rapee & Ryan, 1996; Shortt, Barrett, Dadds & Fox, 2001) highlighted the role of the family in the development of anxious cognition by providing evidence to suggest that parents of anxious children encouraged their child’s avoidant responses to ambiguous situations by demonstrating a tendency to disregard their child’s prosocial utterances, whilst enhancing threat-related discourse.

Creswell and O’Connor (2006) provided further evidence for parental influence in the development of child information processing biases by revealing a significant correlation between mother and child threat interpretations for ambiguous situations. Importantly, this relationship was shown to be partially mediated by the mothers’ expectation of how their child would interpret the situation, indicating that maternal expectation of child threat interpretation may influence how their child interprets ambiguity. Adopting a longitudinal design to explore this finding further, Creswell, O’Connor and Brewin (2006) revealed that maternal expectation of their child’s level of distress in response to the ambiguous scenarios predicted change in their child’s anxious threat interpretation over time. Although this result suggests that child information processing biases potentially develop in response to maternal cognition, there was evidence of a reciprocal pattern whereby child anxious cognitions predicted change in maternal expectation, but only for girls. Thus, these longitudinal findings indicate that the transmission of anxiety from parents to children might be determined by a complex pattern of interactions, which possibly involve child gender and other, as yet, unidentified variables.

In response to the increasing number of studies appearing to demonstrate the transmission of anxious information processing biases from parents to children, Creswell et al. (2010) recently advanced a cognitive-behavioural model elucidating the mechanisms underlying this process (see Figure 1). The model proposes that
parental information processing biases negatively influence their behaviour with their child in a manner that promotes and reinforces child anxious cognition. Two pathways are established through which parental interpretive biases affect parental behaviour. Specifically, a direct pathway where anxious cognitions lead the parent to model a fear response and/or transfer verbal threat information about the feared stimuli; and an indirect pathway where the anxious cognitions negatively influence parental expectations of how their child will respond to the feared stimuli, resulting in parental behaviour that conveys their expectations about poor coping and/or restricts autonomy of the child. The presence of a feedback loop whereby parental expectations are modified by the experience of parenting an anxious child is also hypothesised.

Figure 1. Cognitive-behavioural model of the intergenerational transmission of anxious interpretation biases (Creswell et al, 2010; p.279). Copyright 2010 by John Wiley & Sons Limited.

Field and Cartwright-Hatton (personal communication) proposed a similar model for the intergenerational transmission of anxiety. Contending that parental anxiety is associated with biased cognitive processing of potential threat in their child’s
environment as well as their own, the model asserts that in response to a source of potential threat in their child’s environment, biased parental information processing impacts on parental behaviour in a way that increases opportunities for the child to learn anxiety. The hypothesised behavioural mechanisms in which anxious cognitions are transmitted include vicarious learning, verbal information and direct conditioning. The model also predicts that anxious parents are more likely to engage in certain parenting styles that have been associated with child anxiety, that is, styles characterised by over-involvement and lacking in warmth (see McLeod, Wood & Weisz, 2007, for a review). A further proposed consequence of the parental information processing biases is that anxious parents, perceiving threat in their child’s environment, are likely to seek to minimise this threat through ensuring their child avoids the situation, thus, preventing disconfirmation of their own beliefs and denying their child the opportunity to cope with the potential threat and experience the environment as safe.

Models of intergenerational transmission of anxiety (Creswell et al., 2010; Field & Cartwright-Hatton, personal communication) provide a number of testable hypotheses to explain why children of anxious parents experience an elevated risk of developing anxiety. Whilst consideration of each of these hypotheses is beyond the scope of this review, the evidence to support the notion that parental anxiety is associated with information processing biases which extend to the processing of potential threat in their child’s environment will be discussed.

1.1 Threat interpretation biases

1.1.1 Threat interpretation in adults with anxiety

Consistent with adult models of anxiety (e.g., Beck, Emery & Greenberg, 1985), anxious adults reliably demonstrate a tendency to interpret ambiguous or open-ended stimuli as threatening, whereas, non-anxious adults are more likely to interpret the stimuli as benign (see Harvey, Watkins, Mansell & Shafran, 2004, for a review). For instance, Butler and Mathews (1983) administered clinically anxious adults and non-clinical controls a series of vignettes in which it was not clear from the information presented what was happening (e.g., “You wake up with a start in the middle of the night, thinking you heard a noise, but all is quiet”). Participants
were required to provide their interpretation of the ambiguity and then arrange a predetermined list of possible explanations (e.g., “it could be a burglar”) in the order in which they were most likely to come to mind. Relative to the control subjects, anxious adults demonstrated a greater tendency to interpret the situations as threatening and were significantly more likely to endorse threatening explanations as being more likely to come to mind.

Findings from self-report paradigms have been criticised due to the fact that results could be a reflection of an experimenter demand effect (Harvey et al., 2004; MacLeod & Cohen, 1993). In response to this criticism, a number of paradigms have been developed in which the dependent measure is less transparent. In the homophone spelling task (Eysenck, MacLeod & Mathews, 1987), participants transcribe words presented to them aurally through headphones. The paradigm capitalises on ambiguous homophones inherent in the English language, that is, words which sound the same, but possess spellings associated with either a threatening or non-threatening meaning (e.g., dye/die, pane/pain). The number of threat-related spellings recorded represents the extent to which interpretation has been biased.

Using both homographs (i.e., words with the same written form, but different meanings) and homophones, Eysenck, Mogg, May, Richards and Mathews (1991) developed a more naturalistic measure of the interpretation bias by embedding these words in text to form ambiguous sentences (e.g., “Your boss calls you into his office to discuss the quality of your recent work”). Following the presentation of these sentences and an intervening task, subjects were required to judge the extent to which each of four corresponding sentences matched the original sentence in terms of meaning. Two of the sentences were unrelated to the original sentence (e.g., “Your boss calls you to their office to offer you a pay rise”) and two were closely related to either the threatening meaning (e.g., “Your boss calls you to their office to say that your work is not up to standard”) or non-threatening meaning of the original sentence (e.g., “Your boss calls you to their office to congratulate you on your work”). Compared to the non-clinical controls, clinically anxious participants demonstrated a significant bias in their interpretation of the sentences, as evidenced by their tendency to endorse threatening sentences as closer in meaning to the original sentence.
Methodological difficulties have been identified in both homophone and recognition memory paradigms. For instance, it has been suggested that findings from homophone spelling tasks could result from a response bias rather than a genuine interpretation bias (Harvey et al., 2004). Similarly, although the recognition memory paradigm was developed in order to avoid the possibility of response bias effects, it has been highlighted that increased recognition memory for negative interpretations could represent an anxiety-linked memory bias rather than an interpretation bias (Mathews & MacLeod, 1994). Recently, more sophisticated paradigms have been developed to address these methodological limitations by measuring interpretation of ambiguous information as it is presented (e.g., Calvo & Castillo, 2001; Hirsch & Mathews, 2000; MacLeod & Cohen, 1993).

1.1.2 Threat interpretation in parents with anxiety

Studies investigating the threat interpretation bias in parents have predominantly relied on self-report methods. Bögels, van Dongen and Muris (2003) presented a series of vignettes describing a child in an ambiguous situation to a convenience sample of 36 parents with a child aged 8–17 years. For each scenario, the parents were asked a question designed to establish their interpretation of the situation, specifically, parents were required to report what a typical child might think if faced with such a situation. Correlation analyses between parental anxiety and parental threat interpretation failed to find evidence of a significant association even when the data for mothers and fathers were considered separately. The validity of the method used to assess parental threat interpretation in this study remains unclear. Although parents were instructed to respond to the scenarios by considering what a typical child would think, it is possible that parental knowledge about children in general is informed by their knowledge of their own child. Therefore, parents could have been relying on information about how their child would react to the ambiguous scenarios when responding to the task, rather than basing their response on their own interpretation of the situation. Consistent with this suggestion, a significant correlation between parental and child threat interpretation emerged.

Given the difficulties associated with the paradigm Bögels and colleagues (2003) utilised to assess parental threat interpretation, perhaps a more robust self-report measure would be to require parents to respond to ambiguous scenarios in which
they are the protagonist. Using exactly this method, Creswell, Schniering and Rapee (2005) presented 60 mothers of either a clinically anxious or non-clinical control child, aged between 7–15 years, with a series of adult-appropriate ambiguous scenarios which paralleled those shown to their children. Following the presentation of each ambiguous situation, mothers were provided with a choice of explanations, one threatening and one non-threatening, and asked which interpretation they were more likely to make. Mothers of anxious children demonstrated a small, but significant tendency to interpret the scenarios as threatening. Although these mothers reported significantly higher levels of anxiety than mothers of non-clinical children, no significant association was found between maternal anxiety and maternal threat interpretation. Following family-based child anxiety treatment, anxiety and threat interpretation in the mothers of the anxious children ($N=27$) decreased, however, the authors noted that the limited sample size prevented further analysis to determine the extent to which change in these variables contributed to the change in child anxiety and child threat interpretation scores.

As part of a prospective longitudinal study into the development of interpretive biases in children, Creswell, Shildrick and Field (2010) followed a cohort of 110 community-based children aged between 5–9 years over a 3-year interval. The association between parental anxiety and parental threat interpretation was measured annually using six ambiguous scenarios taken from Butler and Mathews (1983). For each ambiguous situation, parents were required to answer a series of forced-choice questions designed to establish their level of threat interpretation. Parental anxiety was found to predict parental threat interpretation at the first and third time points. A longitudinal association between parental anxiety at the middle time point and parental threat interpretation at the final time point was also revealed.

In addition to self-report methods of measurement, a number of cognitive-experimental paradigms from the adult literature have been adapted to assess threat interpretation in parents. For instance, Gifford, Reynolds, Bell & Wilson (2008) presented 56 mothers of either anxious, externalising or non-clinical control children with a homophone spelling task, but failed to find a significant correlation between parental anxiety and threat interpretation bias. Using the recognition memory paradigm in a sample of 40 parents with a child aged between 4–10 years recruited from local primary schools, Lester, Field, Oliver and Cartwright-Hatton
(2009) provided conflicting evidence. Increased parental anxiety was found to be associated with a tendency to interpret self-referent ambiguous situations as threatening; indicating the presence of a threat interpretation bias in anxious parents that is linked to self-reported anxiety.

Contending that transmission of interpretive biases from parents to children would appear more plausible if it could be empirically demonstrated that parental threat interpretation extends to the processing of their child’s environment, Lester et al. (2009) also measured parental interpretation bias for child-referent ambiguous situations (e.g., “The doctor examines your child’s growth”). Consistent with their previous finding, parental anxiety was associated with an interpretation bias for threat in their child’s environment. This association was, however, weaker than the association between parental anxiety and the threat interpretation bias for self-referent material. Subsequent mediation analysis indicated that the parents’ tendency to interpret ambiguity in the child’s environment as threatening was moderated by their threat interpretation bias for ambiguity in their own environment. Taken together, the findings from Lester et al. (2009) indicate that parental anxiety biases how parents interpret self-referent information and that this bias influences how parents interpret events concerning their child. Furthermore, it is suggested that child-related threat interpretation biases may not exist in the absence of a parental threat interpretation bias for ambiguous events involving the self.

Gallagher and Cartwright-Hatton (2009) provided further evidence that parental threat interpretation biases extend to sources of potential threat in their child’s environment. Using parents as their own controls in a repeated measures design, 30 parents with a child aged between 3–9 years completed an ambiguous situations task adapted from Barrett et al. (1996) whilst in their normal state and after the experimenter had increased their state anxiety. State anxiety was manipulated by leading parents to believe that they would be required to prepare and deliver a speech to camera. Results indicated that, when anxious, parents were more likely to interpret the ambiguous scenarios involving their child as threatening. The extent to which these findings from an analogue population experiencing state anxiety can be generalised to clinically anxious parents does, however, require clarification.
1.1.3 Discussion

Studies investigating the relationship between parental anxiety and parental threat interpretation have produced confusing and conflicting results. However, despite a number of methodological limitations, the data seem to indicate preliminary evidence for an association between parental anxiety and threat interpretation biases for both self-referent and child-related information.

Surprisingly, in contrast to the adult anxiety literature where self-report paradigms reliably provide evidence for a threat interpretation bias in anxious adults, provided the stimuli presented are consistent with the emotional concerns of the population investigated (Mathews & MacLeod, 2005), the few studies that have applied self-report methods to assess the interpretation of self-referent ambiguity in anxious parents have failed to consistently demonstrate a parental threat interpretation bias. The discrepancies between findings in this area are likely partly to reflect the variety of approaches and stimuli used. Only two studies (i.e., Creswell et al., 2005; 2010) used methods of measurement that could confidently be described as valid. Moreover, it could be argued that these studies differed in the extent to which the stimuli they presented was adult-relevant. In the 2005 study, Creswell and colleagues used stimuli adapted from threat interpretation experiments with children, whereas in the longitudinal 2010 study the experimental stimuli were specifically designed for adults. It is noteworthy that the only study to provide evidence for a significant association between parental anxiety and parental threat interpretation is the one which used both a valid method of measurement and adult-appropriate stimuli. Nonetheless, this study did fail to find an association between parental anxiety and parental threat interpretation at all three time points assessed, which may suggest that it is difficult to reliably measure this relationship with self-report stimuli.

Evidence from studies that have adopted more rigorous, cognitive-experimental approaches is also inconsistent. An obvious difference between Gifford et al. (2008) and Lester et al. (2009) is the composition of the samples, with the former study involving parents of clinically anxious children, whilst the latter included a community sample of parents. Therefore, in order to be more certain that parental anxiety is associated with a parental threat interpretation bias, it would be beneficial to replicate both studies in a sample of clinically anxious parents.
A particularly interesting finding to emerge from the reviewed literature is that parental interpretive biases extend to the processing of information in their child’s environment. Unfortunately, both Lester et al. (2009) and Gallagher and Cartwright-Hatton (2009) used methods of measurement that have been criticised within the adult literature for eliciting experimenter demand effects, therefore, replication of the finding using more methodologically rigorous approaches is required to increase confidence in the existence of this relationship. Despite the possibility of a demand effect, Gallagher and Cartwright-Hatton (2009) perhaps provided the strongest evidence for an anxiety-linked child-related threat interpretation bias. The strength of this study was the use of a repeated measures design, which controlled for the influence of child anxiety levels. As discussed later, it is possible that parental threat interpretation develops in response to child anxiety rather than parental anxiety.

On the basis of only a few studies, it is difficult to draw firm conclusions regarding the sample characteristics which may be moderating the relationship between parental anxiety and the tendency to interpret ambiguous information as threatening. In considering the sample differences between studies that have demonstrated significant effects and those that have shown no association, it is possible that significant effects are more likely to emerge from community-based samples with a lower mean child age. The importance of experimental context was highlighted by Shortt et al. (2001) during their investigation into parent-child interactions, as the offer of treatment for child anxiety was found to significantly increase the extent to which parents encouraged their child to engage in avoidant responses to hypothetical threatening situations during family discussion.

1.2 Prospective cognition biases: Estimations, evaluations and expectancies

1.2.1 Prospective cognition biases in anxious adults

There is compelling evidence to suggest that estimations, evaluations and expectancies are influenced by anxiety (see MacLeod, 1999; Mathews & MacLeod, 1994, for reviews). In one of the earliest studies into prospective cognitions in anxious adults, Butler and Mathews (1983) required clinically anxious and non-clinical control subjects to rate the likelihood of occurrence for a series of positive
and negative events (e.g., “How likely is it that if you had a burglar in your home he would attack you?”). Relative to controls, the anxious participants provided elevated likelihood estimates for negative events. Although no difference in perceived likelihood of positive events emerged between the two groups, subsequent experiments using similar methodologies have found evidence to suggest that anxious adults consider positive events as less likely to happen (e.g., MacLeod, Tata, Kentish, Carroll & Hunter, 1997).

The negative influence of anxiety on judgement is not restricted to estimation of future risk (Mathews & MacLeod, 1994). Butler and Mathews (1983) also found that anxious adults provided higher subjective cost ratings than non-clinical controls when asked to rate how aversive it would be to experience each of a series of negative events (i.e., “How bad would it be for you if...?”). A similar finding was reported by Woods, Frost and Steketee (2002), who revealed that estimates of coping ability for idiographic events were negatively correlated with obsessive-compulsive symptoms in student and clinical samples. Evaluations of future performance have also been shown to be influenced by anxiety: Vassilopoulos (2005) identified that individuals scoring highly on measures of social anxiety were more likely to predict poor performance during a speech-to-camera task than individuals who rated themselves as low in social anxiety.

Judgements which overestimate the presence, likelihood or severity of threat are assumed to impact negatively on the decision making and behaviour of anxious adults. Despite the hypothesised importance of these cognitions in maintaining anxiety, the study of judgement biases is a relatively neglected aspect of anxiety-linked information processing. It is possible that this neglect reflects the fact that it is difficult to ascertain the accuracy of certain judgements. Referring to the tendency for non-clinical controls to provide higher likelihood estimates for positive events than negative events, MacLeod (1999) noted that it is not possible to determine whether this finding represents a bias, as positive events may in fact be more likely to occur than negative events. In support of the notion of anxiety-linked judgement biases, a number of studies have demonstrated positive correlations between anxious symptoms and estimates of likelihood or subjective cost (e.g., Stöber, 1997; Woods, Frost & Steketee, 2002). Moreover, there is evidence to suggest that these biases diminish following treatment (Foa, Franklin, Perry & Herbert, 1996; McNally & Foa, 1987; Lucock & Salkovskis, 1988).
Two potential mechanisms have been proposed to account for the effect of mood on judgement: the availability heuristic and the mood-as-information hypothesis (Blanchette & Richards, 2010). The availability heuristic was first suggested by Tversky and Kahneman (1973) when they identified that judgements about uncertain events are influenced by the ease with which similar instances are retrieved from memory. Although this heuristic typically results in fairly accurate judgements, errors can occur under conditions that distort the availability or accessibility of certain memories. It is suggested that mood is an example of a condition that influences the availability of memories. Using a mood induction procedure, MacLeod and Campbell (1992) demonstrated that individuals were quicker to recall mood-congruent events and more likely to predict these events as having a higher probability of occurrence.

The mood-as-information hypothesis (Schwarz & Clore, 1983; 1988) contends that when making evaluative judgements, individuals ask themselves “How do I feel about this?”, and then use this answer to inform their judgement. For example, Arntz, Rauner and van den Hout (1993) asked clinically anxious adults and non-clinical controls to imagine themselves in a number of situations and then rate how dangerous each situation appeared. Situations were varied in terms of how objectively threatening they were and whether it was specified that the participant felt anxious (e.g., “Suddenly you become very anxious”). Anxious participants were found to infer danger on the basis of the anxious response (i.e., “If I feel anxious, there must be a danger”) as well as objective danger, whereas non-clinical controls did not.

1.2.2 Prospective cognition biases in parents with anxiety

Early studies concerning parental prospective cognition typically examined expectancies in parents of anxious children without considering the impact of parental anxiety (e.g., Barrett et al., 1996; Eisen, Spasaro, Brien, Kearney & Albano, 2004; Kortlander, Kendall & Panichelli-Mindel, 1997; Micco & Ehrenreich, 2008; Shortt et al., 2001). Given that parents of clinically anxious children are more likely to be anxious themselves (Cooper, et al., 2006; Last et al., 1987; 1991), researchers have recently begun to establish whether parental anxiety influences their prospective cognition.
Wheatcroft and Creswell (2007) presented 104 parents of community-based children aged between 3–5 years with a series of ambiguous scenarios based on those used by Barrett et al. (1996), but adapted to be developmentally appropriate for preschool children. For each scenario, parents were required to judge how upset their child would be if faced with the situation and then provide a prediction of how their child would behave by selecting a response from a list of options. Parental ratings of their own ability to influence their child’s upset and anxious behavioural response were also recorded for each scenario. Neither parental expectation of child upset, nor parental expectation of child avoidant behaviour were found to be associated with parental anxiety. These expectations were, however, positively correlated with parent-reported child anxiety. Increased parental anxiety was shown to be associated with lower parental estimations of their ability to control avoidant child behaviour. By contrast, parental estimations of their ability to influence child upset were negatively correlated with child anxiety. Therefore, it seems that although some parental expectations are associated with parental anxiety, others appear to be more closely related to parental perceptions of child anxiety.

Using a similar methodology to Wheatcroft and Creswell (2007), Creswell et al. (2010) achieved comparable results in a sample of parents with slightly older children (5–9 years), as parental anxiety was not found to predict parental expectancies of child distress or anxious behaviour at any of the three time points in their 3-year longitudinal study into the development of child interpretive biases. Evidence to suggest that these expectancies develop in response to child anxiety and child anxious cognition did however emerge. Although parental estimations of their ability to influence child anxious upset or behaviour were not measured as part of the present study, parental expectancies of their own level of distress in response to adult-appropriate ambiguous scenarios were assessed. Parental anxiety was shown to predict parental distress cognitions, but only in one of the three time points measured.

Gallagher and Cartwright-Hatton (2009) utilised an outcome generation and evaluation task as well as an ambiguous scenarios task to investigate the role of parental state anxiety on prospective cognition. In response to potential explanations for child-related ambiguous situations, parents provided estimations of likelihood using a rating scale. They were then required to generate as many
possible outcomes to a neutral scenario within two minutes (e.g., “Your child has been picked to play on the school sports team”). Once the outcomes had been generated, parents were asked to rate how likely they thought each outcome was; what their own level of distress would be if it were to occur; and their child’s likely level of distress. Results indicated that, when anxious, parents generated a greater number of negative outcomes to the hypothetical situation. Furthermore, although increased state anxiety did not influence the likelihood estimations from either task, parents predicted greater parental distress when their anxiety was manipulated upwards. In contrast to the findings by Creswell and colleagues (Creswell et al., 2010; Wheatcroft & Creswell, 2007), parents also provided higher ratings of child distress whilst they were anxious, suggesting that estimations of child distress are influenced by parental anxiety.

Criticising the validity of judgements made in response to hypothetical situations, Cobham, Dadds and Spence (1999) examined parental expectations of child performance and distress in response to two real-life 3-minute speech tasks. As children were given the option of whether to participate in the second speech task, parental expectations of whether their child would avoid the second speech were also measured. The study drew comparisons between 73 parents of either anxious, clinical control and non-clinical control children aged 7–14 years. No differences in parental expectations emerged between these groups; however, in order to establish the impact of parental anxiety, parents of anxious children were allocated to either an anxious group or non-anxious group on the basis of self-report measures. Consequently, a further two groups were formed in which either both parent and child were anxious (N=16) or only the children were anxious (N=17). Although anxious mothers and non-anxious mothers expected their children to demonstrate equivalent amounts of skill during the task (e.g., confidence, eye contact, speech clarity), anxious mothers predicted that their child would be more anxious during the task and more likely to avoid taking part in the second speech. Interestingly mothers of anxious children also rated their child’s internalising symptoms as higher, despite the fact that diagnostic interviews revealed no difference in severity between the two groups.

Using a similar public-speaking task, Becker and Ginsburg (2011) investigated parental expectations of child upset, performance and coping ability in response to this naturalistic stressor in mothers of children aged 6–14 years. In contrast to
Cobham et al. (1999), this study included anxious and non-anxious parents of non-anxious children. Furthermore, the more robust method of a diagnostic interview was used to assign mothers to their experimental condition. Maternal state anxiety in response to the child’s task was also recorded using a 9-point Likert scale. Compared to non-anxious mothers, anxious mothers were significantly more anxious about their child participating in the task and were more likely to expect their child to become distressed. No between-group differences emerged in maternal expectations of their child’s performance or coping ability. Further analyses revealed that maternal state anxiety was negatively correlated with expectation of child performance and positively correlated with maternal expectation of child upset. However, it is not clear whether the association between state anxiety and expectation of upset was independent of the association with maternal diagnostic status.

1.2.3 Discussion

Studies investigating the influence of parental anxiety on prospective cognition have predominantly focused on assessing parental expectations of their own distress, their child’s distress and their child’s behaviour in response to either hypothetical or real-life situations. Much like the parental threat interpretation literature, the findings reviewed here present a number of conflicting results. Nevertheless, there is evidence to indicate the presence of significant associations.

Within the context of a fairly limited literature concerning prospective cognition in anxious parents, the evidence suggests that parental anxiety does affect parental expectations of their own levels of distress in response to potentially threatening situations. Similarly, parental estimations of their ability to cope with their child’s anxious behaviour may also be associated with parental anxiety, which would not be surprising as the adult literature indicates that coping ability estimates are reliably affected by levels of anxiety. A number of studies investigated the possibility that parental anxiety is related to biases in parental expectations of child performance or avoidant behaviour, but provided quite mixed results. By contrast, it appears that likelihood estimates for child-related events are not biased by parental anxiety, although replication of this finding in a clinical population would be worthwhile; particularly because a number of findings within the adult anxiety literature suggest that anxiety negatively impacts on such estimates.
The strongest evidence for an anxiety-linked child-related expectancy bias emerged from studies investigating the association between parental anxiety and parental predictions of child distress during anxiety-provoking situations. Although contradictory results were evident within the literature, three well-controlled experiments found parental anxiety to be related to parental expectations of child distress. Given the similarity between the samples that measured this cognition, it seems unlikely that the contradictory findings could be attributed to sample characteristics. However, it is possible that the discrepancy between findings reflects differences in methodology.

Consistent with this assertion, there appear to be differences in findings between studies that elicit parental expectations using hypothetical situations and those that utilise real-life situations. Although parental expectations in response to imminent public speaking tasks are argued to be more valid, these expectations only relate to one situation. The advantage of using hypothetical situations to assess parental expectations is that it allows these cognitions to be measured across a variety of situations, consequently, it could be argued that use of this method provides more representative findings.

An interesting finding to emerge from the literature is that parental state anxiety and diagnosed parental anxiety might have differential effects on prospective cognition. Becker and Ginsburg (2011) identified that increased state anxiety was associated with negative parental expectations of child performance, whereas this expectation did not differ between the groups of anxious and non-anxious parents. Moreover, parental expectation of child anxious upset was associated with both anxiety variables. As it is likely that diagnosed anxiety and state anxiety are correlated, further analyses would be required in order to establish whether each variable made independent contributions to parental expectation. As a result of these findings, it might be advantageous for future research using naturalistic situations to control for increases in parental state anxiety arising from the demands of the task on the child.

A number of the studies reviewed controlled for child anxiety in addition to measuring the impact of parental anxiety. These studies provide the strongest evidence for an effect of anxiety on child-related prospective cognition, as differences in expectations cannot as easily be attributed to the possibility of
differences in child anxiety levels. Cobham et al. (1999) did however reveal that the anxious parents in their sample rated internalising symptoms for their children as significantly higher than the non-anxious mothers. The failure of diagnostic interviews to find any difference in anxiety severity between the two groups suggests that this finding might be a reflection of parental anxiety. However, future research could usefully include objective ratings of child distress and performance during public-speaking tasks (see Kortlander et al., 1997) in order to decisively determine that between-group differences reflect information processing biases rather than accurate parental assessments.

Given that there is evidence to suggest that parental anxiety influences a variety of self-referent and child-related prospective cognitions, future research could attempt to identify whether these cognitions are linked to maladaptive parental behaviours (i.e., control, rejection, modelling, threat information transfer). A number of experimental paradigms exist to measure parenting behaviour during parent-child interactions, therefore, the importance of these cognitions could be assessed by assessing parental expectations prior to the start of the task. On the basis of the reviewed evidence, parental predictions of their own distress and their child’s distress would be particularly interesting to measure. In addition to establishing whether parental prospective cognitions are linked to the manifestation of parental behaviours associated with the development of child anxiety, future research into the intergenerational transmission of anxiety might consider whether certain expectancies are more important that others in eliciting these behaviours.

1.3 Limitations of the extant literature

A number of methodological limitations restrict the conclusions that can be drawn from investigations into the relationship between parental anxiety and parental information processing biases, including: uncertainty regarding both the direction and source of effects, small sample sizes, over-representation of mothers within samples and the narrow range of biases considered. Each of these limitations is outlined below.
1.3.1 Direction of effect

Perhaps the most significant limitation of the existing literature concerning parental anxiety and information processing biases is that the majority of studies have relied on cross-sectional, correlational methodologies. As a consequence, it is impossible to establish causality of the observed association. Therefore, it remains unclear whether information processing biases are a product of parental anxiety or whether parental anxiety develops in response to biased information processing. A few notable exceptions have attempted to establish direction of effect by manipulating anxiety or utilising longitudinal designs. Intervention studies, which measure parental information processing biases before and after anxiety treatment, would be a valuable method for clarifying the direction of effect. Additional longitudinal studies that specifically focus on the development of parental information processing biases may also serve to clarify the direction of effects in this area.

1.3.2 Source of effect

Determining the source of the effect in the association between parental anxiety and parental information processing biases is complicated by the tendency for anxiety to run in families. Family studies (e.g., Turner et al., 1987) suggest that anxious parents often have anxious children. This presents a potential confound to any relationship between parental anxiety and parental information processing because child anxiety is likely to be related to parental anxiety. Thus, without controlling for child anxiety levels, studies designed to determine the impact of parental anxiety cannot rule out the possibility that parental information processing biases develop in response to parenting an anxious child. Although many of the studies reviewed measured child and parent anxiety, a selection of studies either failed to assess child anxiety, or did not utilise this data as part of their analysis.

1.3.3 Sample size

Where evidence for an association between parental anxiety and parental information processing biases exists, the effects generally appear to be quite modest. Whilst this finding might be unsurprising, especially if these biases are also shown to be related to child anxiety, it suggests that in order to have sufficient power to detect significant effects, studies need to utilise relatively large samples.
This might be particularly true of studies concerning child-related information processing biases, as the literature indicates that the magnitude of these biases is weaker than those for self-referent information. Although further research is required to evaluate the reliability of these findings, future studies might need to utilise larger samples to have sufficient power to detect significant effects, especially when investigating child-related information processing biases.

1.3.4 Sample characteristics

A common problem for research concerning parents and their children is that fathers tend to be either under-represented or excluded from samples. Bögels and Phares (2008) proposed a number of potential explanations for this sampling bias. One possibility is that mothers are more willing or indeed available to participate in research. Alternatively, it is possible that researchers have actively excluded fathers from samples on the basis of a priori assumptions that mothers play a more important role in child-rearing. Unfortunately, poor representation of fathers within samples not only limits the generalisability of findings, but prevents gender differences from being investigated. It is possible that parental anxiety differentially affects maternal and paternal child-related information processing; however, without further research based on more representative samples, this hypothesis cannot be explored meaningfully.

1.3.5 Range of information processing biases considered

Adults with anxiety have demonstrated information processing biases that influence attention, memory and reasoning (see Harvey et al., 2004, for a review). Thus far research into the impact of parental anxiety on information processing has only considered biases in reasoning. To the author’s knowledge, the influence of parental anxiety on child-related attention or memory remains unexplored. This limits the strength with which conclusions can be drawn regarding the presence of an association.
1.4 Summary

Establishing the environmental factors underpinning the tendency for anxiety to run in families presents an exciting challenge for child anxiety researchers. Models of intergenerational transmission of anxiety from parents to children have highlighted the importance of parental information processing and parenting behaviour in the aetiology of child anxiety. This review sought to evaluate the evidence for an association hypothesised to be central in the transmission of anxiety, specifically, an association between parental anxiety and parental information processing biases that extend to the processing of information within their child's environment.

The extant literature comprised studies that have investigated the impact of parental anxiety on parental threat interpretation and parental prospective cognition. On the basis of the studies reviewed, there is enough evidence to tentatively support the notion that parental anxiety is associated with parental information processing. Furthermore, it can also be concluded that these biases appear to extend to the processing of potential threat within the child’s environment, as evidence for anxiety linked child-related threat interpretation and child-related expectancy biases was revealed. These cautious conclusions are a consequence of a fledgling literature that is characterised by conflicting results, which appear to arise from between-study differences in measurement, methodology and sampling. Further limitations in study design mean that at this early stage in the literature, it is not possible to determine confidently the direction or source of the effects. Future research could also be usefully directed at answering whether gender impacts on parental information processing and whether parental anxiety also influences attentional and memory information processing biases.

References


The role of parental anxiety in child-related threat interpretation

Prepared in accordance with author guidelines for Behaviour Research and Therapy (see Appendix 2)

Word count: 7827
Abstract

Models of intergenerational transmission of anxiety from parents to children highlight the potential importance of parental information processing biases in determining parenting behaviour during parent-child interactions. This study examined the effect of state anxiety on parental interpretation of ambiguous events involving their child. Fifty-four community-based parents with a child aged between two and eleven years were presented with a text-comprehension task designed to measure child-related threat interpretation. Prior to completing this task, the state anxiety for half of the participants was increased using an anxiety manipulation based on the presentation of anxiety-provoking images. The remaining participants viewed neutral images selected to have little or no influence on their level of state anxiety. Although a manipulation check revealed significant between-group differences in state anxiety, contrary to the experimental hypothesis, no difference in patterns of interpretation was revealed. Possible explanations for the results are discussed, including methodological limitations of the current study.

Keywords: Anxiety, Interpretational bias, Parenting

Highlights:

- Intergenerational transmission of anxiety could be mediated by parental information processing biases.
- Parental anxiety is hypothesised to be associated with biases in parental interpretations of child-related ambiguous events.
- Contrary to expectation, induced parental state anxiety did not influence child-related threat interpretation.
- Methodological limitations may account for the failure to find significant results.
2.0 Introduction

It is well established that anxiety runs in families. Numerous ‘top-down’ studies have identified that children of parents with a diagnosed anxiety disorder are more likely to experience anxiety than children of non-anxious parents (e.g., Beidel & Turner, 1997; Micco et al., 2009; Turner, Biedel & Costello, 1987). ‘Bottom-up’ studies have revealed reciprocal findings; with anxiety disorders shown to be more prevalent in parents of anxious children than in parents of non-anxious children (e.g., Cooper, Fearn, Willetts, Seabrook & Parkinson, 2006; Last, Hersen, Kazdin, Francis & Grubb, 1987; Last, Hersen, Kazdin, Orvaschel & Perrin, 1991). Although a moderate proportion of this relationship has been attributed to hereditary factors (Eley, 2001), a significant proportion is thought to be accounted for by environmental mechanisms.

In attempting to determine the environmental factors associated with the intergenerational transmission of anxiety, much of the research has focussed on family processes (see Bögels & Brechman-Toussaint, 2006, for a review) with particular attention paid to the role of parenting behaviours. Several recent studies have highlighted important differences in the parenting behaviour of anxious and non-anxious adults. Observations of parent-child interactions during stressful situations have revealed that anxious parents are more withdrawn (Turner, Beidel, Roberson-Nay & Tervo, 2003; Woodruff-Borden, Morrow, Bourland & Cambron, 2002), more critical (Hirshfeld, Biederman, Brody, Faraone & Rosenbaum, 1997; Whaley, Pinto & Sigman, 1999), less productively engaged (Schrock & Woodruff-Borden, 2010; Whaley et al., 1999; Woodruff-Borden et al., 2002) and more likely to catastrophise (Becker & Ginsburg, 2011; Muris, van Zwol, Huijding & Mayer; 2010; Moore, Whaley & Sigman, 2004; Whaley et al., 1999) than non-anxious parents. Self-report studies have identified further differences: anxious parents have been found to be more likely to engage in harsh and inconsistent discipline practices than their non-anxious counterparts (Laskey & Cartwright-Hatton, 2009; Robinson & Cartwright-Hatton, 2008).

Many of the behaviours demonstrated by anxious parents in their interactions with their children are characteristic of those that have been implicated in the development of child anxiety (see McLeod, Wood & Weisz, 2007; Rapee, 1997; Wood, McLeod, Sigman, Hwang & Chu, 2003, for reviews). Rejecting parental
behaviours that demonstrate a lack of warmth or acceptance (e.g., criticism, unresponsiveness, dismissiveness) are considered to affect child anxiety by contributing to the development of beliefs that the world is hostile and dangerous and that the self is less than competent (Bögels & Brechman-Toussaint, 2006). Similarly, parental expressions of anxiety, such as catastrophising, are hypothesised to increase the likelihood that children will acquire anxious cognitions through vicarious learning or the transfer of threat information (Rapee, Schniering & Hudson, 2009). The impact of harsh and inconsistent discipline practices on child anxiety is perhaps less well covered in the existing theoretical literature than other parenting behaviours; however, it is suggested that these approaches to discipline are likely to lead to the development of anxious cognitions, especially when punishment consistently erodes the child’s sense of control, security or autonomy (Laskey & Cartwright-Hatton, 2009).

With estimates suggesting that 11% of the adult population are diagnosed with an anxiety disorder each year (Somers, Goldner, Waraich & Hsu, 2006), a substantial number of children are likely to be parented by an anxious parent. It therefore becomes important to establish why anxious parents behave differently with their children. Whilst parenting behaviour is not the only environmental pathway through which anxiety is transmitted from parents to children (Murray, Creswell & Cooper, 2009), further understanding of the processes involved in the observed differences in parenting between anxious and non-anxious parents might guide the development of preventative interventions or lead to improvements in treatment efficacy. Cartwright-Hatton (2006) noted that current child anxiety interventions often encourage parents to act as co-therapists, usually by supporting the child to practice treatment strategies within the home environment. In light of the behaviours demonstrated by some anxious parents, it is questionable whether treatment efficacy might be improved in certain circumstances by not involving the parent in this role.

Application of cognitive-behavioural theory to the parenting behaviours of anxious parents has lead a number of theorists to suggest that parental behaviour is mediated by cognitive processes (e.g., Creswell, Cooper & Murray, 2010; Field & Cartwright-Hatton, personal communication; Hudson & Rapee, 2004; Muris & Field, 2008; Murray et al., 2009). For instance, Field and Cartwright-Hatton proposed a model of the intergenerational transmission of anxiety in which parental anxiety is
hypothesised to be associated with a biased cognitive processing style that influences how parents behaviourally respond to sources of potential threat in their child’s environment as well as their own. Creswell, O'Connor and Brewin (2008) demonstrated the importance of parental cognition in determining parenting behaviour by experimentally manipulating parental expectancies of how distressing their child would find an impossible puzzle task. Parents who were informed that their child may become upset during the task were significantly more likely to engage in maladaptive parenting behaviour than the parents who were instructed that their child would enjoy the task.

While the literature concerning the association between parental anxiety and child-related information processing biases is in its infancy, there is some evidence to suggest that anxious parents are more likely to expect their child to become distressed in response to real-life anxiety-provoking situations (Becker & Ginsburg, 2011; Cobham, Dadds & Spence, 1999). Unfortunately, as neither of these studies measured child distress, it is difficult to determine whether these findings actually represent an accurate assessment of how their child would typically behave. Gallagher and Cartwright-Hatton (2009) did however provide compelling evidence for an anxiety-linked judgement bias using a repeated measures design in which parental state anxiety was manipulated by leading parents to believe that they would have to perform a speech-to-camera. When anxious, parents predicted a greater number of negative outcomes to a neutral scenario involving their child and provided higher ratings of anticipated child distress.

Adapting measures of threat interpretation from the adult literature, two studies have examined whether anxious parents demonstrate a threat interpretation bias for events involving their child. Using a recognition memory paradigm, Lester, Field, Oliver and Cartwright-Hatton (2009) revealed that anxious parents were more likely to interpret ambiguous scenarios as threatening; as evidenced by their tendency to judge threat-related interpretations as more closely related to the original scenario when shown an array of possible alternatives. Using a self-report paradigm, Gallagher and Cartwright-Hatton (2009) provided consistent results: when anxious, parents were more likely to provide threat-related interpretations of the situations. Taken together, these findings appear to provide support for an association between parental anxiety and child-related information processing biases. However,
methodological limitations have been identified with each of the paradigms used by the studies, therefore limiting the conclusions that can be drawn.

Self-report measures of threat interpretation have been widely criticised on the basis that significant findings could reflect either an experimenter demand effect or a response bias (Harvey, Watkins, Mansell & Shafran, 2004). Although the recognition memory task used by Lester et al. (2009) was specifically designed to avoid the possibility of response bias effects, the transparent nature of the dependent variable means that the findings from this paradigm could still be explained by an experimenter demand effect. Some authors (e.g., Hitchcock & Mathews, 1992) have further criticised the recognition memory paradigm by suggesting that it is not clear whether increased recognition memory for negative interpretations of ambiguous situations represents an anxiety-linked interpretation bias or an anxiety-linked memory bias, as a result of that fact the paradigm is unable to establish when the bias actually occurs (i.e., before encoding or during retrieval from memory).

MacLeod and Cohen (1993) devised the text-comprehension task to address the methodological limitations of self-report and recognition memory measures of interpretive biases. The task requires participants to read sets of sentences at their own pace. The first sentence presented is always an ambiguous sentence that could plausibly be interpreted as threatening or non-threatening (e.g., “The strength of the punch took Alan by surprise”). This sentence is then followed by a continuation sentence that relates to either the threatening or non-threatening meaning of the sentence. The two types of continuation sentence differ by only one word (e.g., “He had not expected the blow/alcohol to have such an effect on him”). Once the preceding sentences have been read, a comprehension question that can be answered with either a ‘yes’ or ‘no’ response is presented (e.g., “Did Alan expect the punch to have such an effect on him?”).

Whilst participants are led to believe that their answer to each question is of primary interest, the comprehension latency (reading speed) for the continuation sentence is the critical measure. The paradigm is based on the principle that the comprehension latency of the continuation sentence is inversely related to the extent to which it represents a plausible continuation of the initial ambiguous sentence (MacLeod & Cohen, 1993). Therefore, continuations that are consistent with the interpretation
that has been imposed on the ambiguous sentence will appear more plausible to the reader and will be read faster. By contrast, continuations that are incompatible with the original interpretation of the sentence will appear less plausible and will be read slower.

In order to be confident that differences in comprehension latencies result from anxiety-linked information processing rather than factors unrelated to the interpretation of the initial ambiguity, comparison conditions are created by presenting a cue word before half of the sentence sets. These cue words, either threat-related or non-threat related, serve to constrain the interpretation of the initial sentence so that it is either unambiguously threatening or unambiguously non-threatening. If a threat interpretation bias for ambiguous information is present, participants show similar relative comprehension latencies for the two types of continuation sentences when the initial sentence is presented ambiguously (i.e., uncued) and when it is presented as unambiguously threatening (i.e., threat cued). By contrast, if a threat interpretation bias is absent, participants show similar relative comprehension latencies for the two types of sentence when the initial sentence is presented ambiguously (i.e., uncued) and when it is presented as unambiguously non-threatening (i.e., non-threat cued).

MacLeod and Cohen (1993) maintained that the text-comprehension task addresses each of the three criticisms levelled at the self-report and recognition memory paradigms. Experimenter demand effects are minimised by measuring the dependent variable covertly. The possibility of response bias is addressed by examining patterns of an emotionally neutral response (i.e., button pressing) under different experimental conditions. Consequently, interpretation is not confounded by participant willingness to produce or endorse a particular type of response. Furthermore, the paradigm permits the processing of the ambiguous stimuli to be measured ‘online’ whilst inferences are first being made; thus, it is possible to be confident that any bias reflects interpretive processing and not the retrospective influence of an anxiety-linked memory bias.

The present study set out to investigate the impact of experimentally induced state anxiety on parents’ interpretation of ambiguous events involving their child. It contributes to the existing literature by using a method of measurement which addresses the methodological limitations of paradigms previously used in this field.
It was hypothesised that parents in the induced anxiety group would interpret the ambiguous scenarios as more threatening than parents in the neutral group, resulting in a between-groups difference in the pattern of comprehension latencies across each of the three cue conditions. More specifically, it was suggested that state anxious parents would demonstrate an equivalent tendency to read threatening continuation sentences quicker than non-threatening continuation sentences in the threat cued and uncued conditions when compared to the non-threat cued condition. Correspondingly, comprehension latencies for the non-threatening continuations would be equivalently slower in the threat cued and uncued conditions when compared to the non-threat cued condition. As it was anticipated that parents in the neutral group would not exhibit a threat interpretation bias, it was predicted that they would demonstrate a tendency to read threatening continuations equivalently slower in the uncued and non-threat cued conditions when compared to the threat cued condition, whereas non-threatening continuations would be read equivalently faster in the uncued and non-threat cued conditions relative to the threat cued condition.

2.1 Method

2.1.1 Design

The current experiment adopted a mixed design with experimental group (induced anxiety vs. neutral) as a between-subject factor and cue type (uncued vs. threat cued vs. non-threat cued) and continuation sentence type (threatening vs. non-threatening) as within-subject factors.

2.1.2 Participants

Fifty-four parents were recruited to the study by means of advertisements and flyers distributed in a variety of community locations including schools, children’s centres and the university campus. Parents were included if they had at least one child between the ages of two and eleven years and sufficient proficiency in English to complete the experimental tasks. An a priori power calculation determined that a sample of 50 participants would have 80% power to detect effect sizes of 0.81 or more. Participants had a mean age of 37.50 years ($SD = 5.57$) and primarily
consisted of mothers (35 mothers, 19 fathers). Eighty-five percent of parents described themselves as White British, whilst the remaining parents stated their ethnicity to be either: Caribbean (2%), Bangladeshi (2%), Indian (2%), Asian (2%) or Other (8%). The majority of parents had more than one child ($M = 1.67, SD = .48$); where this was the case, participants were instructed to base their responses on the child whose age was closest to the mid-range (i.e., 6.5 years) of the child age inclusion criterion. Parental responses were based on children with a mean age of 6.68 years ($SD = 2.34$) who were predominantly female (34 girls; 20 boys). Children were not required to be present for any part of the experiment. All parents received £5 compensation for participation.

2.1.3 Materials

2.1.3.1 Anxiety manipulation task
The stimuli for this task were a set of 16 anxiety-inducing images (e.g., scenes of attack, mutilation) and a set of 16 neutral images (e.g., household items, neutral faces) drawn from the International Affective Picture System (IAPS; Lang Bradley & Cuthbert, 2008; see Appendix 3). These image sets were the same as those used by Lincoln, Lange, Burau, Exner and Moritz (2010) to manipulate state anxiety in a sample of adults. This manipulation was replicated in the current sample because it was found to successfully increase self-reported anxiety without influencing other negative affect (e.g., anger, shame). It was necessary to make minor amendments to some of the multiple choice questions, used to encourage elaborated processing of the images, to ensure the English translations were culturally relevant and grammatically correct (e.g., “How many people in Germany die through an gun shot per year?” was changed to “How many people in the UK die from a gunshot wound each year?”).

2.1.3.2 Text-comprehension task
Seventy-two sentence sets were constructed using stimuli adapted from materials used by MacLeod and Cohen (1993) and Lester et al. (2009), as well as additional items devised by the author. Each set included a child-related ambiguous sentence that could be interpreted as threatening or non-threatening (e.g., “The doctor measured your child’s growth”). Such sentences typically described a simple situation where it could be interpreted that the child was at risk of physical threat or negative social evaluation. Each sentence set also contained two alternative
continuation sentences that disambiguated the initial sentence. These continuation sentences represented plausible endings for either the threatening (e.g., “Their tumour had changed very little since the last visit”) or non-threatening interpretation of the initial ambiguity (e.g., “Their height had changed very little since the last visit”). A comprehension question referring to the content of both the ambiguous sentence and the continuation sentence was created for each sentence set. These questions were worded in such a manner that they could be asked regardless of which version of continuation sentence the participant had been shown (e.g., “Did the doctor find much change in your child’s growth since their last appointment?”). Half of the questions had a correct answer of ‘yes’ and half ‘no’. Finally, two different cue words were generated for inclusion into the sentence set; one that was closely related to the threatening interpretation of the ambiguous sentence (e.g., “lump”) and one that was closely related to the non-threatening interpretation (e.g., “tall”). A full copy of the items employed is available from the author (for further examples, see Appendix 4).

2.1.3.3 State-Trait Anxiety Inventory
All participants completed the State-Trait Anxiety Inventory for Adults (STAI; Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983), which is a widely used self-report measure of anxiety. The instrument uses two separate subscales, each comprising 20 items, to assess state anxiety and trait anxiety. The state anxiety subscale (S-Anxiety) is considered to be a measure of the intensity of an anxious response at any given moment in time, whereas, the trait anxiety subscale (T-Anxiety) measures relatively stable individual difference in anxiety proneness. The STAI has been used extensively in research and has sound psychometric properties. The S-Anxiety subscale is frequently used within the literature to measure changes in anxiety associated with a particular experimental task.

2.1.3.4 Positive and Negative Affect Scales – Expanded Form
The Basic Negative Emotion Scales (BNES) of the Positive and Negative Affect Scales – Expanded Form (PANAS-X; Watson & Clark, 1994) were administered to all participants (see Appendix 5). The PANAS-X is a 60-item measure of self-reported affect that requires respondents to use a 5-point Likert scale to rate the extent to which they experience single word descriptions of mood (e.g., “cheerful”). The instrument can be used to measure either state or trait affect, as it has been administered to a normative population using a variety of different temporal
instructions (Watson & Clark, 1994). The BNES is a composite scale formed from the Fear, Hostility, Guilt and Sadness subscales and can be used independently of the other composite scales. The PANAS-X has demonstrated good psychometric properties and has been found to be sensitive to changes in state affect.

2.1.3.5  Experimental software
The stimuli associated with the anxiety manipulation and text-comprehension task were presented on a Dell Inspiron N5030 laptop computer using E-Prime (Schneider, Eschman & Zuccoloto, 2002). Responses were collected using a standard keyboard, with latencies timed and recorded by the software. All text was presented in white, size 12, Arial font against a black background.

For the anxiety manipulation task, each picture was presented centrally on the screen for six seconds. Following this, a multiple-choice question conceptually related to the content of the picture was presented below the picture. The purpose of the question was to facilitate elaborated processing of the image. Once the response to the question had been entered, a black screen was presented for three seconds before the onset of the next picture. The 16 anxiety-inducing images or 16 neutral images were each presented in the order used by Lincoln et al. (2010).

For the text comprehension task, each trial started with the words “Next trial” presented centrally on the screen, which remained on the screen until the ‘space bar’ key was pressed. The display then immediately changed to show “The word clue is...”, underneath which, a cue word was presented. Cue words were present on 50% of trials, for the remaining, uncued, trials a string of five question marks (“?????”) was shown. Once the participant had responded to the cue word by pressing the ‘space bar’ key, the corresponding ambiguous sentence was displayed onscreen. Ambiguous sentences were shown until the ‘space bar’ key was pressed again, at which time either the threatening or non-threatening continuation sentence was presented. The comprehension question was displayed after the participant had responded to the continuation sentence by pressing the ‘space bar’ key. Crucially, comprehension latencies for the continuation sentence were measured by the time elapsed between the key press that triggered the onset of the continuation sentence and the key press which resulted in it being replaced by the comprehension question. Participants’ responses to the comprehension questions were also recorded (‘Y’ key for ‘yes’; ‘N’ key for ‘no’). An inter-stimulus-interval of
two seconds preceded the presentation of the start of the next trial. The 72 sentence sets were presented in a new random order for each participant. The experimental software randomly selected the cue type (threat cue vs. non-threat cued vs. uncued) and the continuation type (threatening vs. non-threatening) for each trial, within the constraint that each participant received set ratios of each possible trial combination (see Table 1 for details).

Table 1
Specified ratios for trial combinations.

<table>
<thead>
<tr>
<th>Cue type</th>
<th>Continuation type</th>
<th>Number of trials (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threat</td>
<td>Threat</td>
<td>9 (12.5%)</td>
</tr>
<tr>
<td>Threat</td>
<td>Non-threat</td>
<td>9 (12.5%)</td>
</tr>
<tr>
<td>Non-threat</td>
<td>Threat</td>
<td>9 (12.5%)</td>
</tr>
<tr>
<td>Non-threat</td>
<td>Non-threat</td>
<td>9 (12.5%)</td>
</tr>
<tr>
<td>No cue</td>
<td>Threat</td>
<td>18 (25%)</td>
</tr>
<tr>
<td>No cue</td>
<td>Non-threat</td>
<td>18 (25%)</td>
</tr>
</tbody>
</table>

2.1.4 Procedure

The procedure was approved by the University of Manchester School of Psychological Sciences Ethics Committee and informed consent was obtained from all participants (see Appendix 6). For the purposes of the anxiety manipulation task, participants were randomly assigned to either the induced anxiety or neutral group upon arrival at the testing site. Randomisation was based on the number (odd = neutral, even = induced anxiety) contained within the blank envelope allocated to each participant. To ensure even group sizes, the envelopes contained the numbers 1–54. Each participant was tested individually in their own home, their workplace or at the university.

Prior to completing either of the experimental tasks, participants were administered the STAI and BNES to establish their baseline levels of affect. Next, a practice session for the text-comprehension task was completed. Participants were informed that they would be presented with pairs of sentences followed by a comprehension question. They were advised that some sentence pairs would be preceded by a clue word and that, whenever this was the case, they must use the clue to anticipate the meaning of the next sentence. Participants were instructed to ensure that they had
understood the meaning of the sentences so that they were as accurate as possible when answering the comprehension questions. The 12 sentence sets used in the practice trial did not include any ambiguous sentences; half of the trials were cued.

Before participants moved on to the experimental text-comprehension trials, the anxiety manipulation task was administered. Participants were told that they would be presented with an image, shown on the screen for six seconds, which would then be followed by a related multiple-choice question. They were instructed to study the picture for the duration it was onscreen and use the keyboard to provide a response to the question when it appeared. Participants in the induced anxiety group viewed the 16 anxiety-inducing images, whilst participants in the neutral group viewed the 16 neutral images. As a manipulation check, the S-Anxiety scale of the STAI and the BNES were re-administered immediately after the images had been displayed.

Upon completion of the anxiety manipulation task, participants were reminded of the instructions for the text-comprehension task. The 72 experimental text-comprehension trials were then presented. All participants were fully debriefed at the end of the experiment and given the opportunity to ask questions.

2.1.5 Preliminary analysis

Prior to analysis, text-comprehension data were examined. Following Mogg, Bradbury and Bradley (2006), two participants with a high proportion of incorrect answers to the comprehension questions (less than 70% correct) were excluded from the analysis because their response accuracy indicated that they had been inattentive to the task. The mean percentage accuracy for the remaining participants was 91% for parents in the induced anxiety group and 92% for parents in the neutral group. Furthermore, comprehension latencies below 200ms or above 30,000ms were excluded from further analysis, as data outside of these parameters were considered to be outliers. The proportion of data lost to outliers was less than 0.1%.

2.2 Results

2.2.1 Between-group characteristics
The demographic characteristics of participants in the induced anxiety group were compared to those of participants in the neutral condition (see Table 2). The groups did not differ significantly in terms of parent age or child age. In order to conduct chi-square analyses of the categorical variables, categories within parent ethnicity, child ethnicity, number of children and annual household income were collapsed to meet the assumptions of the test. Analyses revealed that the groups did not differ in terms of parent gender, parent ethnicity, child ethnicity, annual household income or number of children parented. A significant association was, however, revealed between experimental group and child gender. This finding appears to reflect the fact that children of parents in the induced anxiety group tended to be female.

Table 2
Demographic characteristics of participants in the induced anxiety and neutral conditions.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Induced anxiety group (N=26)</th>
<th>Neutral group (N=26)</th>
<th>t/x²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>37.48</td>
<td>37.03</td>
<td>.29</td>
</tr>
<tr>
<td>SD</td>
<td>5.28</td>
<td>5.84</td>
<td></td>
</tr>
<tr>
<td>Parent gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>16</td>
<td>.34</td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Parent ethnicity</td>
<td></td>
<td></td>
<td>.17</td>
</tr>
<tr>
<td>White British</td>
<td>22</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Non-White British</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Number of children</td>
<td></td>
<td></td>
<td>.36</td>
</tr>
<tr>
<td>One child</td>
<td>7</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>More than one child</td>
<td>19</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Annual household income</td>
<td></td>
<td></td>
<td>2.67</td>
</tr>
<tr>
<td>Below £40,000</td>
<td>9</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>£40,000 - £59,000</td>
<td>12</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>£60,000+</td>
<td>5</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Child age</td>
<td></td>
<td></td>
<td>-.14</td>
</tr>
<tr>
<td>M</td>
<td>6.58</td>
<td>6.67</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>2.22</td>
<td>2.55</td>
<td></td>
</tr>
<tr>
<td>Child gender</td>
<td></td>
<td></td>
<td>6.72*</td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Child ethnicity</td>
<td></td>
<td></td>
<td>1.04</td>
</tr>
<tr>
<td>White British</td>
<td>19</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Non-White British</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05
The possibility of between-group differences in baseline affect was also investigated. As self-report ratings of emotion are often skewed (Finucane & Power, 2010), the distribution of each of these variables was examined. Skewness and kurtosis values indicated that none of the baseline affect scores were normally distributed. A series of Kolmogorov-Smirnov tests confirmed this suggestion, as baseline distributions of S-Anxiety, T-Anxiety, Fear, Hostility, Guilt and Sadness scores were all found to be significantly different from normal. Attempts to transform the data were unsuccessful; consequently, the data were subjected to non-parametric analysis using the Mann-Whitney test. No significant between-group differences emerged on any of the questionnaire measures of negative affect at baseline (see Table 3). Examination of the mean state and trait anxiety scores for both experimental groups at baseline revealed that they were within one standard deviation of the values reported by Spielberger et al. (1983) for the normative sample of working adults.

Table 3
Between-group differences on baseline measures of affect.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Induced anxiety group (N=26)</th>
<th>Neutral group (N=26)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mdn</td>
<td>M</td>
<td>SD</td>
<td>Mdn</td>
</tr>
<tr>
<td>STAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-Anxiety</td>
<td>27.00</td>
<td>29.50</td>
<td>8.52</td>
<td>30.50</td>
</tr>
<tr>
<td>T-Anxiety</td>
<td>38.00</td>
<td>37.65</td>
<td>6.22</td>
<td>35.00</td>
</tr>
<tr>
<td>BNES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>6.00</td>
<td>7.00</td>
<td>1.39</td>
<td>6.00</td>
</tr>
<tr>
<td>Hostility</td>
<td>6.00</td>
<td>6.42</td>
<td>.90</td>
<td>6.00</td>
</tr>
<tr>
<td>Guilt</td>
<td>6.00</td>
<td>6.92</td>
<td>2.10</td>
<td>6.00</td>
</tr>
<tr>
<td>Sadness</td>
<td>5.00</td>
<td>5.88</td>
<td>2.08</td>
<td>5.00</td>
</tr>
</tbody>
</table>

* p < .05

2.2.2 Anxiety manipulation check

In order to assess the effect of the anxiety manipulation, baseline affect scores were subtracted from post-manipulation scores to provide change scores for each variable. Between-group differences in these scores were then investigated using the Mann-Whitney test (see Table 4). Participants in the induced anxiety group showed significantly greater change in S-Anxiety, Fear, Hostility and Sadness.
scores. These differences reflected increases in each of these variables following the anxiety manipulation. No significant between-group difference was found for Guilt scores. Therefore, although the anxiety manipulation was effective in increasing anxiety, it had the unintended effect of increasing other negative emotions in the induced anxiety group.

Table 4
Between-group differences in changes of affect following the mood manipulation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Induced anxiety group (N=26)</th>
<th>Neutral group (N=26)</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mdn</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>STAI S-Anxiety</td>
<td>4.00</td>
<td>7.19</td>
<td>11.66</td>
</tr>
<tr>
<td>BNES Fear</td>
<td>.00</td>
<td>2.31</td>
<td>4.80</td>
</tr>
<tr>
<td>Hostility</td>
<td>.00</td>
<td>2.31</td>
<td>4.40</td>
</tr>
<tr>
<td>Guilt</td>
<td>.00</td>
<td>1.04</td>
<td>4.13</td>
</tr>
<tr>
<td>Sadness</td>
<td>.00</td>
<td>2.12</td>
<td>4.48</td>
</tr>
</tbody>
</table>

* p < .05  
** p < .01

2.2.3 Comprehension latencies

Prior to analysis, the distribution of the comprehension latency data was examined. As it was found to be significantly non-normal, $D(3742) = .13$, $p < .001$, the data were transformed using the natural log transformation. A 2 x 3 x 2 mixed-design analysis of variance (ANOVA) was performed on the transformed comprehension latencies, with cue type and continuation type as within-subject factors and experimental group as a between-subject factor (see Table 5 for means). There was a significant main effect of cue type, $Wald(2) = 8.97$, $p < .05$. Bonferroni-corrected pairwise comparisons indicated that comprehension latencies for uncued trials were significantly shorter than comprehension latencies for threat cued trials ($p < .05$). Although a similar pattern emerged between the comprehension latencies for non-threat cued trials in relation to uncued trials, this difference was found to only approach significance ($p < .06$).
**Table 5**

Mean comprehension latency data.

<table>
<thead>
<tr>
<th>Cue Type</th>
<th>Threat continuations</th>
<th>Non-threat continuations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>95% Wald Confidence Interval</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Induced anxiety group (N=26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threat</td>
<td>3005</td>
<td>2689</td>
</tr>
<tr>
<td>Non-Threat</td>
<td>3161</td>
<td>2870</td>
</tr>
<tr>
<td>Uncued</td>
<td>2927</td>
<td>2641</td>
</tr>
<tr>
<td></td>
<td>2898</td>
<td>3672</td>
</tr>
<tr>
<td></td>
<td>2636</td>
<td>3228</td>
</tr>
<tr>
<td>Neutral group (N=26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threat</td>
<td>2702</td>
<td>2370</td>
</tr>
<tr>
<td>Non-Threat</td>
<td>2952</td>
<td>2591</td>
</tr>
<tr>
<td>Uncued</td>
<td>2738</td>
<td>2455</td>
</tr>
<tr>
<td></td>
<td>2563</td>
<td>3186</td>
</tr>
<tr>
<td></td>
<td>2438</td>
<td>3012</td>
</tr>
</tbody>
</table>

Consistent with the assertion that comprehension latencies of the continuation sentences would be differentially influenced by the cue condition of the trial, a highly significant interaction between cue type and continuation sentence type was revealed, $\text{Wald}(2) = 13.27$, $p < .001$. As can be seen from Table 6, the data indicated that, relative to non-threat continuations, threat continuations were comprehended 203 msec quicker when the cue type was threatening (i.e., when the initial interpretation of the sentence had been constrained to its threatening meaning by the cue word). By contrast, relative to non-threat continuations, threat continuations were comprehended 239 msec slower when the cue type was non-threatening (i.e., when the initial interpretation of the sentence had been constrained to its non-threatening meaning by the cue word). No substantial speeding or slowing of threat continuations, relative to non-threat continuations, occurred on uncued trials, as evidenced by the fact that only a -19 msec difference existed between the two types of continuation sentence in this cue condition. Taken together, the relative differences between continuation sentences across each of the three cue conditions supports the assumption comprehension latencies were influenced by the initial interpretation of the ambiguous sentence.
Despite the highly significant cue type x continuation type indicating the sensitivity of the paradigm, the three-way interaction between experimental group, cue type and continuation type was found to be non-significant, Wald(2) = .54, NS. This finding failed to support the hypothesis of a between group difference in the pattern of relative comprehension latencies across the three cue conditions. To ensure that the aforementioned between-group difference in child gender was not masking a relationship between experimental condition and patterns of interpretation, the ANOVA was repeated whilst including child gender (males vs. females) as a between-subject factor. Both the main effect of child gender, Wald(1) = .69, NS., and the four-way interaction between child gender, experimental group, cue type and continuation type were found to be non-significant, Wald(6) = 8.85, NS. Therefore, it can be concluded that interpretation of child-related ambiguity was not affected by the fact that there was a greater proportion of female to male children in the induced anxiety group.

### 2.3 Discussion

The present study attempted to develop the literature regarding the association between parental anxiety and child-related information processing biases. While there is some compelling evidence to suggest that parental anxiety negatively influences parental expectations of their child, previous studies examining child-related threat interpretation have used methods of measurement that have been the subject of much criticism; consequently, it is difficult to draw a similar conclusion regarding the existence of an anxiety-linked threat interpretation bias. The current experiment sought to address this problem by adapting a more methodologically rigorous approach to threat interpretation measurement for use with parents. Based
on the existing literature, it was hypothesised that parents in the induced anxiety group would interpret ambiguous sentences involving their child as more threatening than parents in the neutral group. Contrary to this hypothesis, no significant between-group difference in patterns of interpretation was identified. Therefore, it appears that state anxiety does not influence how parents understand and process events involving their child.

Given the extant literature concerning parental anxiety and child-related threat interpretation biases, the failure to find evidence of this bias in the present sample was unexpected. Both Lester et al. (2009) and Gallagher and Cartwright-Hatton (2009) provided evidence that parental anxiety was associated with biased processing of child-related ambiguous scenarios. However, these findings were based on methods of measurement that were susceptible to experimenter demand effects due to the transparent nature of the dependent variable. Therefore, a possible explanation for the discrepancy in findings could be the fact that the current experiment assessed child-related threat interpretation covertly, whilst leading participants to believe that the answers to the comprehension question was the variable of interest. If this notion were correct, it would question the validity of existing findings regarding an anxiety-linked child-related threat interpretation bias. Furthermore, it would be inconsistent with the pattern of threat interpretation findings observed within the adult literature, because, rather than refuting findings from the self-report and recognition memory paradigms, MacLeod and Cohen (1993) provided converging evidence for an anxiety-related bias.

An alternative account for the present finding in relation to the existing literature is that the experimental design contributed to the non-significant result. Whilst certain aspects of the methodology can be questioned, the inclusion of an anxiety manipulation check combined with the nature of the text-comprehension allowed the source of the non-significant between-groups difference to be partly elucidated. The significant cue type x continuation type interaction indicated that the text comprehension paradigm was sensitive to how parents interpreted the ambiguous information. In particular, the fact that comprehension latencies were quicker when cue and continuation type were congruent suggests that latencies were influenced by the interpretation of the initial ambiguous sentence. As it can be concluded that the text-comprehension paradigm was capable of measuring differences in threat interpretation, the failure to find a significant between-group difference is likely to be
the result of insufficient levels of state anxiety in participants in the induced anxiety group, a confounding influence of non-anxious negative affect, sample size, or a combination of these factors.

For ethical reasons, the anxiety manipulation was designed to induce only mild-to-moderate levels of anxiety. It is possible that, although significant, the elevation in anxiety scores witnessed in the induced anxiety group following the presentation of the IAPS pictures was insufficient to influence information processing. Consistent with this assertion, the mean post-manipulation S-Anxiety score for the induced anxiety group ($M = 36.69$) remained within one standard deviation of the mean for the normative sample of working age adults ($M = 35.46$, $SD = 10.51$). Furthermore, as negative affect was not assessed on completion of the text-comprehension paradigm, it is not clear whether the increase in anxiety observed in the induced anxiety group lasted for the duration of the task. Very few studies have addressed how long induced moods last, although a recent study by Gomez, Zimmermann, Guttormsen and Danuser (2009) indicated that negative affect lasts for at least nine minutes. Given that the text-comprehension task typically took participants approximately 20 minutes, it is remains unclear as to whether the increase in state anxiety was still present at the end of the task.

Analysis of the post-manipulation affect data revealed that the anxiety manipulation had the unwanted effect of increasing hostility and sadness as well as anxiety. Interestingly, this finding was inconsistent with the findings by Lincoln et al. (2010), who noted that the IAPS component of their mood manipulation procedure did not significantly influence anger, shame or sadness. It is possible that the unexpected post-manipulation increases in hostility and sadness had a confounding effect on the threat interpretation of participants in the induced anxiety group, such that their tendency to demonstrate a threat interpretation bias was diminished. However, like the changes in anxiety, the changes in these variables were modest and so it is unclear whether they had an effect at all. If a significant between-group difference had emerged, it may have been possible to further explore the influence of these increases using an analysis of covariance.

A further methodological limitation of the current study was the sample size. Lester et al. (2009) provided evidence to suggest that the association between parental anxiety and the child-related threat interpretation bias might be weaker than the
association between parental anxiety and the threat interpretation for self-referent information. If this is the case, it is possible that the sample size for the present experiment was under-powered, as the sample size calculation was based on the existing adult literature concerning threat interpretation biases.

Given the methodological limitations identified, particularly in regard to the anxiety manipulation procedure, it would be worthwhile to replicate the current study in either a non-clinical sample including both high trait anxious and low trait anxious individuals or in a clinical sample of anxious parents with a control group of non-anxious parents. Moreover, once an association between parental anxiety and biased processing of child-related information is established, future research could usefully be directed at further exploring the hypotheses associated with models of intergenerational transmission of anxiety. For instance, it would be beneficial to investigate whether these biases mediate the expression of the maladaptive parenting behaviours exhibited by anxious parents.

In summary, the current study failed to demonstrate an association between parental state anxiety and parental interpretation of ambiguous events involving their child. As the text-comprehension task was shown to be a sensitive measure of interpretation, this finding is likely to reflect methodological limitations associated with the anxiety manipulation or sample size. Alternatively, the discrepancy between the present finding and the extant literature could be a result of differences in methods of measurement, as previous studies which revealed positive findings used methods that have been criticised for being susceptible to experimenter demand effects. Further research is required in order to definitively determine whether the significant associations between parental anxiety and child-related threat interpretation reported within the existing literature represent a genuine anxiety-linked bias or a manifestation of experimenter demand.

References


Critical evaluation
3.0 Introduction

The research presented in the current thesis aimed to provide a greater understanding of child-related information processing biases in anxious parents. Recent models of intergenerational transmission of anxiety have highlighted the potential importance of such cognitive processes in determining parental behaviour during parent-child interactions (Cartwright-Hatton & Field, personal communication; Creswell, Murray & Cooper, 2010). Although parental behaviour has long been associated with the development of child anxiety, the notion that this process is partly mediated by parental cognition is relatively novel and reflects recent findings suggesting a relationship between the information processing styles of parents and their children (e.g., Creswell & O'Connor, 2006; Creswell, O'Connor & Brewin, 2006).

In preparation for the empirical paper, a review of the extant literature concerning information processing biases in anxious parents was conducted. The literature was found to be characterised by contradictory findings that were difficult to reconcile given the limited number of published studies in the area. It was however concluded that the hypothesised association between parental anxiety and parental information processing biases was supported by the evidence. Moreover, a number of studies provided findings consistent with the suggestion that parental information processing biases extend to their child’s environment; as anxious parents were found to be more likely to interpret ambiguous events involving their child as threatening and more likely to predict that their child would become distressed during challenging situations.

In addition to the tentative conclusions regarding the relationship between parental anxiety and biased information processing, the review identified a number of methodological limitations within the literature. For instance, it emerged that the studies which had investigated child-related parental threat interpretation had used methods of measurement which had been criticised within the adult anxiety literature as being susceptible to experiment demand effects. The empirical paper sought to address this particular issue by adapting a more methodologically rigorous approach to threat interpretation measurement for use with parents.
Investigating the hypothesis that state anxious parents would demonstrate a tendency to interpret ambiguous events involving their child as threatening, a sample of community-based parents were recruited to one of two experimental groups: an induced anxiety group in which state anxiety was either increased through viewing anxiety-provoking images or a control group in which neutral images were viewed and state anxiety was not intentionally manipulated. Although parents in the induced anxiety group reported significant increases in state anxiety and other aspects of negative emotion, no between-group differences in child-related threat interpretation were found. It remains unclear whether this finding reflects design limitations of the current study or a failure for anxiety-linked parental threat interpretation biases to extend to situations involving their child.

The present paper aimed to systematically evaluate both the literature review and the empirical paper in terms of strengths and weaknesses, whilst considering alternative approaches that could have been used and the methodological implications to emerge from findings. Finally, implications for clinical practice and possible directions for future research are discussed.

3.1 Literature review

Establishing the environmental mechanisms underpinning the intergenerational transmission of anxiety has become an increasingly important question to researchers in the field of child anxiety, as evidenced by the proliferation of published studies and theoretical models in recent years. Despite numerous suggestions that parental anxiety is associated with cognitive biases toward threat, the evidence to support this notion had not been critically reviewed previously. One possible explanation for this is that the hypothesised association had not been systematically evaluated as part of a programme of research. Instead, the impact of parental cognition on the aetiology of child anxiety has been evaluated in a piecemeal fashion using a variety of different approaches. A review which aimed to draw together existing findings in an attempt to guide future research was therefore considered timely.

One of the challenges in conducting the review was determining the studies which met the inclusion criteria. Many studies have explored the role of parental
information processing in the development of child anxiety, but often without measuring parental anxiety. Similarly, some studies have measured both parental anxiety and an aspect of parental information processing, but without measuring or reporting any association between these variables. Although neither of these types of studies met the inclusion criteria for the review, it was necessary to carefully review both the methods and results sections of papers identified during the search process to assess whether the inclusion criteria had been met. The tendency for only more recent studies to report associations between parental anxiety and parental information processing is likely to reflect the fact that, historically, researchers were primarily interested in identifying differences between the cognitions of parents of anxious children and parents of non-anxious children.

Nine studies were identified as meeting the inclusion criteria for the review. Initially, there was concern that this number might not be sufficient. As a consequence, the possibility of broadening the focus of the review to encompass studies that examined the relationship between parental anxiety and anxiogenic parental behaviour was contemplated. After careful consideration, it was decided that the lack of consensus in the extant literature regarding parental anxiety and parental information processing literature would sustain a review. Moreover, addition of a section on parental anxiety and parental behaviour would have placed the manuscript at risk of being too large for submission to the intended journal for publication (see Appendix 1), especially because there is such an extensive literature on this topic. On reflection, this decision resulted in a literature review that remained closely related to the content of the empirical paper.

A limitation of the literature review was the tentative nature of the conclusions drawn. Unfortunately, the conclusions reflected the inconsistency between findings arising from differences in measurement, methodology and sampling. Differences in measurement, in particular, appear to have resulted from the piecemeal fashion with which the literature has developed: there appears to be little consensus, for instance, in how parental threat interpretation should be assessed, which expectations are particularly important to explore and whether these expectations should be measured in vivo or through the use of hypothetical scenarios. As the literature develops, however, it may be possible to explore the moderating influence of these variables through systematic review. Similarly, the strength of conclusions could be elucidated through the use of a meta-analytic approach to the literature.
Notwithstanding the identified difficulties and limitations, the literature review successfully achieved the aim of providing a narrative summary of findings related to the association between parental anxiety and parental information processing biases. Furthermore, despite tentative conclusions, the review was able to provide guidance to assist future research in the area by identifying design limitations within the existing literature, suggesting the most rigorous methods of measurement and highlighting evidence for child-related biases.

3.2 Empirical paper

3.2.1 Ethics

The process of gaining ethical approval for the current study had a substantial impact on the direction of the thesis. Initially, it was intended that parental behaviour during a parental-child interaction task would be measured in addition to parental information processing biases. It was hypothesised that state anxious parents would be more likely to engage in maladaptive parenting behaviours whilst completing a difficult anagram task with their child. Furthermore, it was predicted that this relationship would be mediated by a tendency to interpret ambiguous events involving their child as threatening. The appeal of this proposed experimental design, in contrast to the present design, was that it permitted relationships between the hypothesised mechanisms involved in the intergenerational transmission of anxiety to be explored. The extent to which parental information processing biases influence parental behaviour is not something that has previously been investigated.

During the university ethical approval process, the ethics committee raised a concern that it would be difficult for an individual researcher to occupy both a parent and a child during testing, particularly when the child was not required to complete a task for a large part of the session. It was therefore suggested that an additional researcher be sought for the purposes of data collection to help ensure that both the parent and child were adequately attended to. Whilst this suggestion was carefully considered, it seemed that the need for an additional researcher to be present during testing would have been a barrier to recruitment, especially given the already limited window of time each day when a parent, their child and the first experimenter

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would be available to complete testing. On balance, it was decided that the aspect of the experiment involving children be removed from the research proposal. Interestingly, this decision not only resulted in a more ethically sound study, but also one with a more focussed aim. The concern raised by the committee does however highlight the difficulty in assessing parent-child dyads given the limited resources available to the researcher as a doctoral student in clinical psychology.

The university ethics committee also had reservations regarding the use of images from the International Affective Picture System (IAPS; Lang Bradley & Cuthbert, 2008). As it is not necessary to manipulate anxiety in order to study its effects, the committee had to carefully consider whether this method was justified. An alternative method for investigating the impact of anxiety would have been to create groups of high trait anxious and low trait anxious parents by using the trait questionnaire from the State-Trait Anxiety Inventory for Adults (STAI; Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983). Experimentally manipulating the independent variable has a number of advantages over the quasi-experimental approach of allocating participants to a condition based on a particular characteristic. For instance, manipulating state anxiety for each participant enabled the author to randomly allocate parents to the experimental groups which reduced the possibility of participant characteristics that co-vary with parental anxiety confounding the results. Furthermore, with the limited time constraints on recruitment for the current study, a quasi-experimental approach could have led to uneven group sizes especially if one group of participants was harder to access than the other.

Given the ethical committee objective to protect the public from unnecessary distress, a further consideration for the committee was whether this particular method of anxiety manipulation was safe. This issue of safety was addressed by Bradley and Lang (2007) who noted that the IAPS images are equivalent to those that can be viewed within newspapers or on television and that the intensity of an emotional reaction to a picture is less than that elicited by actual events. Moreover, an advantage of the IAPS in comparison to other anxiety manipulations (e.g., viewing clips from films or public-speaking tasks) is that the normative response to the pictures has been quantified.
A final consideration for the university ethics panel was ensuring that participants were able to provide their informed consent prior to participating. In designing the participant information sheet, the researcher made certain that the range of images that could be presented was made clear. Furthermore, participants were discouraged from participating if they felt that they might become unduly distressed by the images. In response to the committee’s suggestion, the presentation of this text was highlighted using bold and underlined font to ensure it stood out to potential participants; the final version of which can be seen at Appendix 7. A number of participants from the induced anxiety group commented that, on the basis of the description presented, they had anticipated that the IAPS pictures to be considerably more distressing. Therefore, it seems likely that the description enabled participants to provide their informed consent.

3.2.2 Design

In examining the impact of parental anxiety on parental threat interpretation for events involving their child, the present study adopted an experimental design. This is in contrast to many of the existing studies within the literature which often have relied on cross-sectional, correlational methodologies. An inherent difficulty with cross-sectional designs is that conclusions regarding the causal direction of effect cannot be made with any confidence. Establishing direction of effects is a particularly pertinent issue for child anxiety research given that anxious parents often have anxious children (Cooper, Fearn, Willetts, Seabrook & Parkinson, 2006; Last, Hersen, Kazdin, Francis & Grubb, 1987; Last, Hersen, Kazdin, Orvaschel & Perrin, 1991): such findings give credence to the possibility that parental information processing biases develop in response to parenting an anxious child, rather than parental anxiety.

Although the present experiment did not reveal any between-group differences in patterns of interpretation, if a significant effect had emerged, one could have been fairly confident that the variation in results was a consequence of the anxiety manipulation. By randomly allocating participants to the experimental groups, the likelihood of between-group differences in levels of child anxiety occurring other than by chance was reduced. Therefore, any significant effect could have been attributed to the influence of parental anxiety. The design could, however, have been improved if each participant had completed a measure of child anxiety prior to
completing the experimental tasks. Inclusion of a child anxiety measure would have enabled any between-group differences in levels of child anxiety occurring by chance to be identified and controlled for during analysis.

3.2.3 Recruitment

Initially, it was intended that participants would be recruited from local primary schools in the Manchester and Trafford area. Unfortunately this method of recruitment proved to be more difficult than expected. Very few of the 109 schools contacted acknowledged receipt of the written communication asking for permission to advertise the study to the school’s parents (see Appendix 8). Follow-up phone calls often established that the schools were not willing to participate in the research. A number of headteachers explained that their school had recently been involved in a university research project. Anecdotally, this suggests that schools within the local area receive frequent requests to participate in research studies and that this acts as a barrier to recruitment. A conversation with one headteacher did, however, reveal that internal and external pressures also made it difficult for schools to prioritise involvement in research projects.

Requiring permission from headteachers to advertise a study to a school’s parents means that they act as a ‘gatekeeper’ to recruitment. Given the frequency with which schools receive research requests and the general pressures placed upon them, it is possible that headteachers are most interested in research projects that are salient to them. Two schools within the the North West region gave their consent for the study to be advertised to their parents. Interestingly, it appeared the most effective recruitment strategies were word of mouth and advertising the study to the teachers who were parents within one of the aforementioned schools. Unfortunately, both of these recruitment strategies had the potential to limit the generalisability of the findings if the populations assessed were not representative of the population as a whole. Comparison of the self-reported ethnicity for the current sample with population estimates for the North West region indicated that individuals from a White British background were not overrepresented (Office for National Statistics, 2011). However, it remains possible that the sample differed in terms of unmeasured participant characteristics (e.g., highest level of educational attainment).
The difficulties that were encountered in recruiting parents from schools located within the Manchester area suggest that, in future, it might be advantageous to contact schools from areas that are not in such close proximity to the numerous academic institutions within Greater Manchester. Alternatively, given the success in recruiting parents from their place of work, it might be fruitful to recruit participants by contacting medium-to-large businesses that operate within the local area to ask for permission to advertise the study to their staff. Although businesses are likely to experience similar internal and external pressures to schools, it is possible that they receive fewer requests to participate in research. Consequently, the unusual nature of the request might mean that both the person acting in the ‘gatekeeper’ role and the staff themselves are more inclined to take part.

3.2.4 Sample characteristics

A potential explanation for the failure to find a significant between-group difference in child-related threat interpretation could be that the study lacked the necessary power. The sample size calculation indicated that with 25 participants in each group, the study would have 80% power to detect effect sizes of 0.81 at the 5% significance level. Based on findings of relatively large effect sizes for the threat interpretation bias within the adult literature, a total sample size of 50 was judged to be appropriate. However, the few studies that have measured child-related information processing biases appear to indicate medium effect sizes (e.g., Gallagher & Cartwright-Hatton, 2009). Lester, Field, Oliver and Cartwright-Hatton (2009) directly compared the effect sizes for self-referent and child-referent information interpretive biases and provided evidence to suggest that the association between parental anxiety and the child-related threat interpretation bias might be weaker than the association between parental anxiety and the threat interpretation bias for self-referent information. If these findings are reflective of the true effect size between parental anxiety and child-related information processing biases, basing the sample size calculation on effect sizes within the adult literature might have reduced the power of the study to detect significant effects.

Despite the tendency for fathers to be significantly underrepresented within child anxiety research samples, 19 of the 54 participants included in the current sample were fathers (i.e., 35%). While this figure is short of an equal proportion of mothers and fathers, it is common for studies within the literature to report samples where
less than 15% of participants are fathers (e.g., Creswell, Shildrick & Field 2010; Lester et al., 2009). Ensuring fathers are adequately represented in samples increases the generalisability of findings and is especially important given recent suggestion that fathers make a unique contribution to the transmission of anxiety (Bögels & Perotti, 2011). Unfortunately, the current sample size was too small to conduct meaningful analyses into gender differences in parental interpretation of child-related ambiguous events. Exploring these hypothesised differences could be an aim for future research.

3.2.5 Anxiety manipulation

A number of different anxiety manipulations were considered for use in the present study. Within the mood induction literature; imagination of idiosyncratic emotion-ridden events, exposure to distressing film clips, fabricated performance feedback and speech preparation tasks have all been used to manipulate participant mood (see Westermann, Spies, Stahl & Hesse, 1996, for a review). The appeal of using a subset of IAPS images to induce anxiety (see Appendix 3) was that the normative affective responses to the pictures is known, therefore, the extent to which people are likely to become anxious in response to the images can be judged. Moreover, previous studies have confirmed that the presentation of IAPS images that are rated as high in arousal and low in valence increases self-reported anxiety (e.g., Lincoln, Lange, Burau, Exner & Moritz, 2010; Pacheco-Unguetti, Acosta, Callejas & Lupiáñez, 2010) and results in physiological changes consistent with an anxious mood-state (e.g., Smith, Bradley & Lang, 2005). A further factor contributing to the decision to use the IAPS images was that use of standardised stimuli increases the ease with which findings can be replicated.

Perhaps one of the difficulties in using the IAPS to manipulate anxiety is that there is little consensus on how to best present the images. For instance, within the literature, anxiety-inducing IAPS images have been presented in isolation (e.g., Smith et al., 2005), alongside anxiety-provoking statements (e.g., Pacheco-Unguetti et al., 2010) or with anxiety-provoking questions (e.g., Lincoln et al., 2010). The procedure used by Lincoln and colleagues was replicated, as their analysis suggested, albeit in a clinical sample of adults, that the images they presented successfully increased state anxiety without increasing the intensity of other negative emotions (i.e., anger, shame, sadness). The present study failed to
replicate this finding, as, in addition to increases in state anxiety, post-manipulation increases in hostility and sadness were also achieved. This pattern of results suggests that it might be difficult to reliably increase state anxiety in isolation from other emotions or that there might be differences in how clinical and community-based populations respond to IAPS anxiety manipulations.

Although the failure to find between-group differences in patterns of interpretation could have resulted from the increases in the intensity of negative emotions moderating the influence of state anxiety, an alternative explanation is that the effect of the anxiety manipulation did not last for the duration of the text-comprehension task. Little is known about the length of time an induced mood state persists for. Gomez, Zimmermann, Guttormsen and Danuser (2009) investigated this issue after presenting participants with a series of mood-inducing film clips. Effects of the mood induction were found to last for at least nine minutes. The text-comprehension task used within the present experiment typically took participants about 20 minutes to complete. Therefore, the effect of the anxiety manipulation could have diminished during the experimental task.

Demand characteristics and the size of the increases in state anxiety must also be considered as potential explanations for the lack of a significant between-group difference in child-related threat interpretation. Examination of the post-manipulation changes in state anxiety revealed that, although the mean change reached statistical significance for participants in the induced anxiety group, scores remained within one standard deviation of the mean for working age adults (Spielberger et al., 1983). It is possible that this change was therefore insufficient to influence patterns of interpretation. Alternatively, the change in anxiety scores could be a reflection of an experimenter demand effect rather than a true change in state anxiety. Although it would have been difficult for participants to ascertain which aspect of mood was being manipulated from the questionnaires presented, it is likely that they were aware that mood was expected to change after the anxiety manipulation. If this resulted in a demand effect for increases in state anxiety, one would not expect the parents’ interpretation of ambiguous sentences involving their child to be influenced, as it would not be a reflection of a genuine change in parental anxiety.

The identified limitations of the anxiety manipulation have a number of implications for future research. Given the uncertainty relating to whether a single emotion can
be manipulated in isolation, studies utilising anxiety manipulations should routinely assess for changes in other negative emotions so that any change can be controlled for during the analysis. As the duration of induced moods remains unclear, it would be advisable to re-administer measures of mood at the end of the experiment, consider presenting experimental trials in blocks or assess persistence of mood using physiological measures (e.g., skin conductance levels, heart rate, startle magnitude). According to Westermann et al. (1996), demand effects can be avoided by using physiological or behavioural (e.g., psychomotor speed) measures of affect or controlled for by adding a control condition to the study where participants are instructed to behave as if anxious.

3.2.6 Text comprehension

The text-comprehension task was selected as a method of measurement for the child-related threat interpretation bias on the basis that it was more methodologically rigorous than either the self-report or recognition memory paradigms. In comparison to the other paradigms, the text-comprehension task does have some disadvantages. For example, the task is perhaps slower to complete and also requires participants to possess higher levels of literacy. The main disadvantage, however, is the fact that it relies on considerably more stimuli than the other paradigms. Typically self-report studies of threat interpretation present approximately 10–12 ambiguous scenarios (e.g., Butler & Mathews, 1983; Gallagher & Cartwright-Hatton, 2009). Similarly, recognition memory tasks usually show roughly 20 – 30 ambiguous sentences (e.g., Eysenck, Mogg, May, Richards & Mathews, 1991; Lester et al., 2009). In contrast to both of these paradigms, MacLeod and Cohen (1993) presented 80 ambiguous scenarios. The text-comprehension paradigm requires considerably more stimulus material than other methods of measurement because each sentence set can be presented in six different ways (e.g., threat cued, threatening continuation vs. uncued, non-threatening continuation). Consequently, numerous sentence sets have to be developed in order to ensure that the mean for each presentation condition is based on a sufficient number of measurements.

Creating child-related ambiguous scenarios that were equally salient to parents of two year-olds and ten-year-old children presented a significant challenge. The possibility of restricting the experiment inclusion criteria to parents of children within
a more narrow age range was considered. However, given the time restraints on recruitment, it was evident that it would be more beneficial to keep the inclusion criteria for the experiment as broad as possible. In total, 72 ambiguous scenarios which were applicable to as many children as possible within the specified age range were created (see Appendix 4 for examples).

Notwithstanding the difficulties in adapting the text-comprehension task to the measurement of child-related threat interpretation, a key finding to emerge from the empirical paper was that paradigm was effective in measuring differences in comprehension latencies resulting from the initial interpretation of the ambiguous sentence; a finding which suggests that this paradigm could usefully be employed to measure child-related parental threat interpretation biases in anxious and non-anxious parents in the future.

3.3 Implications for clinical practice

The findings from the literature review indicate that anxious parents experience information processing biases which extend to the processing of potential threat in their child’s environment. Whilst this finding was not supported by the empirical paper, it is worthwhile to consider the implications of such biases in relation to treatment and prevention.

There is scope for improvement in the efficacy of current interventions for child anxiety disorders. In a review of the literature, Cartwright-Hatton, Roberts, Chitsabesan, Forthergill and Harrington (2004) found that 44% of children fail to recover following treatment with cognitive-behavioural therapy. Interestingly, parental anxiety appears to be a factor in predicting treatment outcomes for children, with children of non-anxious parents showing a poorer treatment response (Creswell & Cartwright-Hatton, 2007; Cooper, Gallop, Willetts & Creswell, 2008). Perhaps an explanation for this finding is that parental information processing biases are influencing their behaviour with their child. Cartwright-Hatton (2006) noted that current child anxiety treatments often involve parents in generalising treatment strategies from the clinic room to the home environment. If anxious parents experience child-related cognitive biases it is likely that their heightened sense of threat will make it difficult for them to support their child’s exposure to the
feared stimuli. Therefore, the child is prevented further from challenging their anxious cognition. Consequently, the present findings suggest that careful consideration should be given to involving parents as co-therapists in child anxiety treatment. Assessment of parental anxiety levels may help clinicians to weigh-up the relative benefits of this approach.

Preventative interventions for child anxiety are frequently targeted at children within a school setting (see Neil & Christensen, 2009, for a review). Whilst intervening within a school context provides the opportunity to increase the reach of such programmes, the association between parental anxiety and child-related information processing biases suggests that the efficacy of these interventions could be improved by also targeting anxious parents. Educating parents about the presence and influence of such biases, whilst imparting strategies to directly challenge them has the potential to disrupt the transmission of anxiety from anxious parents to their children. Consistent with this assertion, Ginsburg (2009) reported promising results from a family-based anxiety preventative intervention in which anxious parents and their children are taught strategies to prevent the onset of child anxiety. More specifically, parents were encouraged to avoid modelling, reduce controlling behaviour and criticism of their child. At one-year follow-up 30% of children in the control group had developed an anxiety disorder, compared to 0% of children whose families completed the preventative intervention.

3.4 Implications for future research

Both the literature review and the empirical paper suggest that further research into the association between parental anxiety and child-related information processing biases is required. Given the tendency for anxious parents to have anxious children, a research priority should be to attempt to establish the causal direction of effect in the relationship. Examining child-related information processing biases in parents before and after treatment would be one method of achieving this, as post-treatment reductions would be indicative that the biases are linked to anxiety. Alternatively, a longitudinal approach in which the relationships between parental anxiety, child anxiety and parental information processing were assessed at multiple time points would help to elucidate the extent to which parental and child anxiety contribute to the biases. Replication of the experimental repeated measures design used by
Gallagher and Cartwright-Hatton (2009) would also help to determine direction of
effects, as the use of parents as their own controls removes the confounding effect
of child anxiety status and, therefore, has the potential to demonstrate a clear
causal relationship between parental anxiety and child-related information
processing biases.

In order to progress research concerning the intergenerational transmission of
anxiety, it would be useful to investigate whether parental information processing
mediates the relationship between parental anxiety and parental behaviour. As
mentioned earlier, this could be achieved by including a measure of parenting
behaviour. A number of observational paradigms have recently been developed to
investigate parenting behaviour during parent-child interactions. Combining one of
these approaches with a measure of parental information processing in anxious and
non-anxious parents would enable a mediation analysis to be conducted.

It is noteworthy that the aforementioned studies all require a valid and reliable
measure of child-related information processing biases. In the area of parental
threat interpretation, the text-comprehension shows promise as a rigorous method
of measurement; however, further application of the paradigm to this population is
required to be confident in this assertion. With regard to parental expectations, the
literature review highlighted the need for studies to include an objective assessment
of child behaviour following parental predictions; otherwise the possibility that
judgements are an accurate assessment of child behaviour cannot be ruled out. A
further consideration is whether methods of measurement for anxiety-linked
attentional biases or memory might prove more accurate. Both types of biases have
been examined within the adult literature, therefore, it is possible that the existing
paradigms could be adapted to measure child-related information processing biases
in parents.

3.5 Summary

Considering the literature review and empirical paper in turn, the present critical
evaluation aimed to evaluate each piece of work in terms of their strengths and
weaknesses. Within this framework, alternative methodologies that could have been
utilised were highlighted, methodological implications were discussed and the
research process as a whole was reflected upon. Finally, implications for clinical practice were identified and avenues for future research were suggested.

References


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Clinical Psychology Review publishes substantive reviews of topics germane to clinical psychology. Its purpose is to help clinical psychologists keep up-to-date on relevant issues outside of their immediate areas of expertise by publishing scholarly but readable reviews. Papers cover diverse issues including: psychopathology, psychotherapy, behavior therapy, behavioral medicine, community mental health, assessment, and child development.

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DESCRIPTION

Behaviour Research and Therapy encompasses all of what is commonly referred to as cognitive behaviour therapy (CBT). The focus is on the following: theoretical and experimental analyses of psychopathological processes with direct implications for prevention and treatment; the development and evaluation of empirically-supported interventions; predictors, moderators and mechanisms of behaviour change; and dissemination and implementation of evidence-based treatments to general clinical practice. In addition to traditional clinical disorders, the scope of the journal also includes behavioural medicine. The journal will not consider manuscripts dealing primarily with measurement, psychometric analyses, and personality assessment.

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Appendix 3: Images presented during the anxiety manipulation
Appendix 4: Exemplar sentence sets from the text-comprehension task
<table>
<thead>
<tr>
<th>Threat Cue</th>
<th>Non-threat Cue</th>
<th>Ambiguous Sentence</th>
<th>Threatening Continuation</th>
<th>Non-threatening continuation</th>
<th>Comprehension question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>untalented</td>
<td>talented</td>
<td>Everyone was talking about your child's performance in the school play</td>
<td>Most of the parents thought that their singing had ruined the show</td>
<td>Most of the parents thought that their singing had saved the show</td>
<td>Were the parents commenting on your child's dancing?</td>
<td>No</td>
</tr>
<tr>
<td>distress</td>
<td>invite</td>
<td>You did not see your child waving in the sea</td>
<td>Otherwise you would have swum out to rescue them</td>
<td>Otherwise you would have swum out to join them</td>
<td>Did you swim out to your child?</td>
<td>No</td>
</tr>
<tr>
<td>tantrum</td>
<td>paintings</td>
<td>Your child's display attracted a lot of attention</td>
<td>Nobody thought they could create such havoc</td>
<td>Nobody thought they could create such artwork</td>
<td>Did anyone expect such a display from your child?</td>
<td>No</td>
</tr>
<tr>
<td>bully</td>
<td>cashier</td>
<td>Your child handed their money to the boy</td>
<td>After counting it carefully the boy put it in his rucksack</td>
<td>After counting it carefully the boy put it in his till</td>
<td>Did the boy count your child's money carefully?</td>
<td>Yes</td>
</tr>
<tr>
<td>missing</td>
<td>hiding</td>
<td>You could not find your child in the park</td>
<td>They had been missing for some time</td>
<td>They had been hiding for some time</td>
<td>Were you able to find your child quickly?</td>
<td>No</td>
</tr>
<tr>
<td>discipline</td>
<td>praise</td>
<td>Your child was asked to report to the headteacher's office</td>
<td>The headteacher wanted to discipline them for their behaviour</td>
<td>The headteacher wanted to praise them for their behaviour</td>
<td>Did the headteacher call your child to their office to talk about their behaviour?</td>
<td>Yes</td>
</tr>
<tr>
<td>lost</td>
<td>draw</td>
<td>Your child could not trace their favourite toy</td>
<td>It was much too difficult to find</td>
<td>It was much too difficult to copy</td>
<td>Did your child find tracing the toy easy?</td>
<td>No</td>
</tr>
<tr>
<td>coma</td>
<td>sleep</td>
<td>It was past 8am and you could not wake your child</td>
<td>Their unconsciousness caused you extreme distress</td>
<td>Their laziness caused you extreme distress</td>
<td>Were you upset by your child's condition?</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Appendix 5: Basic Negative Emotion Scales
This questionnaire consists of a number of words and phrases that describe different feelings and emotions.

Read each item and then mark the appropriate answer in the space next to that word.

Indicate to what extent you feel this way right now (that is, at this present moment).

Use the following scale to record your answers:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>very slightly or not at all</td>
<td>a little</td>
<td>moderately</td>
<td>quite a bit</td>
<td>extremely</td>
</tr>
</tbody>
</table>

- _____ disgusted
- _____ sad
- _____ guilty
- _____ angry at self
- _____ scared
- _____ ashamed
- _____ nervous
- _____ downhearted
- _____ irritable
- _____ shaky
- _____ lonely
- _____ blameworthy
- _____ blue
- _____ alone
- _____ hostile
- _____ frightened
- _____ afraid
- _____ angry
- _____ jittery
- _____ loathing
- _____ disgusted with self
- _____ scornful
- _____ dissatisfied with self
Appendix 6: Consent form
SCHOOL OF PSYCHOLOGICAL SCIENCES

Consent form

Title of Project: Mood and information processing in parents.

The participant should complete the following part of this sheet him/herself

1. Have you read the Participant Information Sheet? YES/NO
   Initials: ...........

2. Have you received enough information about the study? YES/NO
   Initials: ...........

3. Do you understand that you do not need to take part in the study and if you do enter you are free to withdraw:
   * at any time
   * without having to give a reason for withdrawing
   * and without detriment to you?
   YES/NO
   Initials: ...........

4. Do you agree to take part in this study? YES/NO
   Initials: ...........

Name of participant: ......................... Signed: ......................... Date: .........................

Name of researcher: ......................... Signed: ......................... Date: .........................

This project has been approved by the
School of Psychological Sciences Research Ethics Committee
Appendix 7: Participant information sheet
SCHOOL OF PSYCHOLOGICAL SCIENCES
Participant Information Sheet

Title of project: Mood and information processing in parents

Introduction
We are interested in how mood affects how parents process information.

What will I be asked to do if I take part?
If you decide to take part, we will ask you to fill out some questionnaires that ask about personal information (e.g. questions about your mood, how you generally feel, your age and ethnicity, your child’s age and ethnicity).

Next, we will ask you to look at some photographs on a computer screen. Some of these photographs may show scenes of a violent or threatening nature (e.g. images of severely injured bodies, car accidents or people being attacked); Each photograph will be displayed for 8 seconds and you will be asked a question that is related to the picture. Seeing and thinking about the photographs might make you feel distressed.

After viewing the photographs we will ask you to fill out some more questionnaires about your mood. Following this, you will be asked to answer questions about pairs of sentences shown to you on a computer screen. Some sentences may refer to your child in threatening situations. It is possible that reading these sentences may cause an element of distress for some people. The sentences can be read at your own pace.

It is expected that the experiment will last approximately 1 hour.

Will my data be confidential?
All information that is collected about you and your child will be kept strictly confidential.

Data collected during the experiment will be stored using anonymous participant numbers. Information linking your name to the anonymous participant number will be kept in a password-protected file accessible only to the experimenters. All data can therefore be identified and deleted upon request.
Do I have to take part?
No. You do not have to take part in the study. If you decide to take part and later change your mind, either before you start the study, during it or afterwards, you can withdraw without giving your reasons and, if you wish, your data will be destroyed.

Are there any risks involved in taking part?
There are no significant risks involved in this study. However, some people may become distressed whilst viewing the photographs. **If you think that you might find such photographs overly upsetting, do not take part in this study.**

If you are upset or concerned by any of the issues raised by this study, please discuss this with your researcher or contact Dr Anja Wittkowski on 0161 306 0400 or via email: Anja.Wittkowski@manchester.ac.uk

Where can I obtain further information if I need it?
For further information about the study, please contact either

Ross Mackenzie
Ross.Mackenzie@postgrad.manchester.ac.uk

or

Dr Anja Wittkowski
Anja.Wittkowski@manchester.ac.uk

This project has been approved by the
School of Psychological Sciences Research Ethics Committee
Appendix 8: Letter requesting permission to recruit parents from schools
Dear Headteacher,

I am writing to you to ask if your school would be willing to help with a piece of research being conducted by the University of Manchester as part of a Doctorate in Clinical Psychology. I would like to be able to contact parents from your school to ask them if they would like to take part in the research.

The study will investigate the effect of mood on parents' information processing and is designed to contribute to answering why anxiety tends to run in families. The study focuses on parents with a child aged between three and ten years of age, so I would like to contact the parents of children in reception class as well as years 1, 2, 3, 4 and 5.

With this letter, I have enclosed a copy of the participant information sheet and a copy of the experimental protocol, which provides more detail about the study. These are for your information.

I have also enclosed an authorisation letter, and if you are happy to help with this research at this stage, then I would be very grateful if you could complete and return this letter.

I will contact you in the next two weeks to discuss whether your school will be able to support this piece of research and to answer any questions you may have about the study. I would welcome the opportunity to come and meet with you to discuss the study if you are able to spare the time. I would also be interested in hearing your views about how best to contact parents.

In the meantime, if you have any questions relating to the study please do not hesitate to contact me. Alternatively, you can contact my supervisor Dr Anja Wittkowski.

Yours sincerely,

Ross Mackenzie

Supervised by:
Dr. Anja Wittkowski, Clinical Psychologist (Anja.Wittkowski@manchester.ac.uk)