

A Neglectful Parenting Style Moderates the Effect of the Verbal Threat Information Pathway on Children's Heart Rate Responses to Novel Animals

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Abstract. Parenting styles are associated with anxiety in children. Part of this association can be explained by how parenting interacts with known pathways to anxiety. Although parenting interacts with the verbal threat information pathway to create anxiogenic cognitions in children, it is not known whether parenting styles mediate the physiological component of the anxiety emotion. An experiment is reported in which 6–10-year-old children ($N = 54$) completed parenting styles, and anxiety beliefs questionnaires. They were then given threat, positive or no verbal information about three novel animals before being asked to place their hands in boxes they believed these animals inhabited. Their average heart rate during the approach was recorded. The results suggest that a neglectful maternal parenting style mediates the effect that verbal threat information has on physiological responses. However, a punitive maternal parenting style, maternal warmth, overprotection, and accurate monitoring were not found to have a significant effect. Paternal parenting styles were not found to have any significant effect. This experiment adds to the existing evidence demonstrating that parenting practices can mediate components of acquired anxiety emotions.

Keywords: Parenting styles, anxiety, children.

Introduction

Anxiety disorders tend to originate in childhood (Öst and Treffers, 2001) and are the most prevalent childhood psychological disorder (Cartwright-Hatton, McNicol and Doubleday, 2006). Approximately 3% of British children will be affected by an anxiety disorder at any one time (Ford, Goodman and Meltzer, 2003). This anxiety has very serious effects on academic and social functioning (Pine, 1997) and often persist into adulthood (Kim-Cohen et al., 2003). The importance of understanding the origins of childhood anxiety and the role the family can play in creating and protecting against it are, therefore, paramount. Anxiety runs in families (Turner, Beidel and Costello, 1987), yet only one-third is attributable to genetic factors, with the remaining variance attributable to environmental factors (Eley et al., 2003). Field and Cartwright-Hatton (2007) noted that, as parents are the primary environmental influence on young children, it is likely that some of the association is due to parenting because it will affect the learning opportunities that a child has. Parenting practices are important in explaining

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the intergenerational transmission of anxiety (Bögels and Brechman-Toussaint, 2006). For example, anxious parents appear to be more withdrawn during laboratory-based activities with their children (Woodruff-Borden, Morrow, Bourland and Cambron, 2002) and anxious mothers express more critical behaviours and less warm, interactive behaviours towards their children (Whaley, Pinto and Sigman, 1999). Parental “overcontrol”, which is often conceptualised as practices that discourage independent problem solving and general excessive “monitoring”, in children’s early environments is also a contributory factor to the development of anxiety (Chorpita and Barlow, 1998). Wood, McLeod, Sigman, Hwang and Chu (2003) suggest that greater specificity is needed to assess the particular role that parenting plays in the acquisition and maintenance of anxiety disorders in childhood. Field and Cartwright-Hatton (2007) also point out that studies that have shown a correspondence between child and parent anxiety (see Bögels and Brechman-Toussaint, 2006; Wood et al., 2003 for reviews) do not show that parenting styles causally create child anxiety. Field and Cartwright-Hatton suggest that parenting practices feed into the learning process, and propose a model of the intergenerational transmission of anxiety in which parental behaviours and cognitions filter through to their children via verbal information, vicarious learning and direct traumatic experiences (Rachman, 1977). One implication of this is that different parenting styles will create differences in the exposure and, therefore, sensitivity that a child has to receiving threat-related experiences.

Verbal threat information is arguably the main threat-related experience through which children develop anxiety (Hadwin, Garner and Perez-Olivas, 2006). Verbal threat information is implicated by anxious adults as a route through which their anxiety developed (see Ollendick and King, 1991 for a review). Experimental studies have also shown that verbal information about animals (Field, Argyris and Knowles, 2001; Field and Lawson, 2003) and social situations (Field, Hamilton, Knowles and Plews, 2003; Lawson, Banerjee and Field, 2007) has a causal role in the development of anxiety in children. Verbal information has been shown to change all three of Lang’s (1968) response systems of the anxiety emotion in children: cognitions (Field, 2006a, b; Field et al., 2001, 2003; Field and Lawson, 2003, 2008; Field, Lawson and Banerjee, 2008), avoidance behaviour (Field, 2006a; Field and Lawson, 2003; Field et al., 2008) and physiological responses (Field and Schorah, 2007). If certain parenting styles affect the sensitivity that a child has to verbal threat information then we would expect parenting styles to moderate the effect that verbal threat information has on children’s anxiogenic cognitions, behaviours and physiological responses. Only one study has tested this proposition. Field, Ball, Kawycz and Moore (2007) showed that a punitive maternal parenting style mediated the effect of verbal threat information about a novel animal on 6–9-year-old children’s anxiety cognitions. Also, children reporting a greater number of negative interactions with their fathers had greater increases in threat beliefs about novel animals after both threat and no information. The quality of mother-child relationships did not significantly interact with the verbal information pathway. These preliminary studies have shown a clear route through which parenting might act; however, they looked only at changes in Lang’s cognitive response system. The aim of this experiment was, therefore, to assess whether parenting practices moderate the effect that verbal threat information has on a second of Lang’s response systems: the physiological response system. The experiment reported here used Field and Lawson’s (2003) well-established threat information paradigm and included a parenting styles measure. We predict that if parenting styles affect children’s sensitivity to verbal threat information then they will significantly moderate the effect that verbal threat information has on children’s heart rate to novel animals.

Method

Participants

The participants were 54 primary school children (22 boys and 32 girls) aged 6–10 years ($M = 89.93$, $SD = 12.64$ months). This age range was chosen as it is an age range within which normative anxiety is typically animal focused (Field and Davey, 2001). Children were recruited from two schools in East Sussex, UK. The socio-economic status was higher than the national average, and participants were predominantly Caucasian. Informed parental consent was obtained for all participating children: parents were sent letters detailing the procedures involved in the experiment (but not the hypotheses) along with a consent form to return to the school. As part of the consent letter, parents were asked to tell their children that they could withdraw at any point, and this instruction was re-iterated to the children at the beginning of the test session. Children were tested individually.

Materials

Animals. Pictures of three Australian marsupials, the Quoll, the Cuscus, and the Quokka were used. These were animals about which the children had no prior experience and so they would have no prior anxiety expectations. Each picture had a caption below it that clearly named the animal.

Information. The threat and positive information used by Field and Lawson (2003) were used in this experiment (Appendix A). These sets of information are approximately matched for length and word frequency (see Field and Lawson, 2003). The name of the animal in the information was changed to fit the experimental condition.

The Parenting Style Questionnaire (PSQ). Perceived parental style was assessed using The Parenting Style Questionnaire, PSQ (Smith, Padley, Bowers and Binney, 1993). The PSQ is an adaptation of the Parental Bonding Instrument (Parker, Tupling and Brown, 1979), for use with children. It measures five maternal and paternal parenting styles. Children are presented with 30 statements (printed on small cards), each reflecting one of 5 parenting styles: warmth (e.g. "Shows she loves me"), punitiveness (e.g. "Has locked me in my room for punishment"), accurate monitoring (e.g. "Talks to me about what I should and should not do"), overprotection (e.g. "Worries about me too much") and neglect (e.g. "Does not mind much where I go after school"). The child "posts" the card into one of three boxes labelled "Not at all like", "A bit like", and "A lot like". The boxes are scored 1, 2 and 3 respectively. The internal consistencies for the current maternal sample were $\alpha = .20, .47, .39, .34,$ and $.66$ and for the paternal sample were $\alpha = .001, .63, .54, .58,$ and $.58$ for warmth, punitiveness, overprotection, accurate monitoring, and neglect respectively.

Heart rate. Heart rate was measured using either a 610i Polar portable heart rate monitor (used by Field and Schorah, 2007) or a Cat Eye PL-6000. The 610i Polar monitor consisted of an elasticized chest belt with two plastic sensors, which was worn under clothing and measured heart rates. A wristwatch recorded data from the chest belt. The Cat Eye PL-6000 sensors were incorporated in a small non-invasive ear clip. Both devices were programmed to record the average heart rate over a 15 second period. Results from the two devices were comparable.

Beliefs Questionnaire (FBQ). Children's beliefs about the animals was measured with the FBQ (Field and Lawson, 2003). This instrument consists of 7 statements repeated once for each animal, each with a 5-point Likert response scale (0 = No, not at all; 1 = No, not really; 2 = Don't know/Neither; 3 = Yes, probably; 4 = Yes, definitely). The average score from 0–4 was calculated for each animal such that a high score represented high anxiety beliefs and 0 represented no anxiety beliefs. The FBQ has high internal consistency across many studies and has been used numerous times with children aged between 6 and 12 (Field, 2006a, b; Field et al., 2007; Field and Lawson, 2003, 2008; Field et al., 2008), the internal consistencies in the current sample were comparable to past research: before the information $\alpha = .81, .71$ and $.67$ for the cuscus, quokka and quoll subscales respectively and $\alpha = .95, .96$ and $.96$ after the information.

Touch-box task. Avoidance was assessed with a behavioral task used by Field and Lawson (2003), Field et al. (2008) and Field and Schorah (2007). For each animal, a touch box was created consisting of a large wooden box, with a round hole at one end and a plaque showing the name of its animal inhabitant. A hessian curtain covered the hole with a slit in the middle such that the child could put their hand into the box but could not see what the box contained. Each box contained a furry cuddly toy.

Procedure

For each child the PSQ was administered first. Children were then randomly allocated to one of three counterbalancing orders that differed in regards to which animal was associated with which type of information: (1) quoll (threat), cuscus (positive), quokka (none); (2) quokka (threat), quoll (positive) cuscus (none); and (3) cuscus (threat), quokka (positive), quoll (none).

A custom written computer programme (by the second author) in Visual Basic.net was used to administer the FBQ and information; run on an Acer Aspire 1360 laptop. First the FBQ was administered: the initial computer screen provided detailed instructions of what would happen during the task. The next screen showed a named picture of one of the animals and a question below (e.g. Do you think a quokka would hurt you?). Children responded to the questions by clicking on one of five buttons clearly labelled; "No, not at all", "No, not really", "Don't Know/Neither", "Yes, probably", "Yes, definitely". Having made their response a button labelled "Sure?" appeared; this enabled children to confirm their response prior to moving to the next question. All 21 questions of the FBQ appeared in randomized order. Next, instructions were displayed informing the children that they would hear some information about the animals. They were informed that the person providing the information was a teacher. A picture of a female adult (an "average" female face, aged mid-20s supplied by Professor David Perrett's laboratory at St Andrew's University, UK) appeared on the left of the screen and a variety of named pictures of the animal corresponding to the information were presented individually to the right of the screen. Children listened to the information through headphones from a pre-recorded MP3 file with the voice of a female in her mid 20s. For this initial study it was important to be sure that the information would have the desired effect, therefore the pre-recorded voice file used in previous studies (e.g. Field et al., 2007; Field and Schorah, 2007; Field and Storksen-Coulson, 2007) was used rather than getting parents to provide the information. The type of information they heard was determined by their counterbalancing order. As a further counterbalancing measure, approximately 50% of

the children heard the threat information first and the remainder heard the positive information first. Children then completed the FBQ again.

Finally, the behavioural task was administered to assess the children's heart rate as a measure of their anxiety. For ethical reasons, when the 610i Polar was used the experimenter did not fit the chest belt to the children. They were required to fit the belt themselves or in same sex pairs if they preferred. The touch box task began with the experimenter checking that the heart rate data were being recorded properly. The three touch boxes were placed side by side across two tables, one metre apart. The touch boxes were arranged as quoll, quokka, cuscus respectively. The children were all asked to approach the boxes in the same order¹. Children stood approximately one metre in front of the box for 15 seconds, after which they were asked to approach the first box. The children were asked to stroke the animal inhabitant, and were given 15s to do so. After a 15s period the children were asked to return to the starting point. Although children were asked to stroke the animals, the touch boxes contained straw in front of the animals; therefore children did not actually get to touch the "animals". Thus, even after attempting to touch the first animal, children still believed the boxes contained real animals. The mean heart rate during the 15s approach period was recorded. The child remained at the starting point for 15s before being asked to stroke the second animal. As before, they were given 15s to complete the task and the average heart rate during the period was recorded. Children then returned to the starting point for 15s prior to approaching the third and final box. All children were fully debriefed using fact sheets, games and puzzles about the animals. Children were also informed that there were no real animals involved in the study.

Results

The anxiety information had the expected effect on self-reported anxiety beliefs and behavioural avoidance; these data are reported in Price-Evans and Field (2007). As in Field et al. (2007) a hierarchical multilevel model was used to examine whether maternal and paternal parenting styles (as perceived by the child) influenced the effect that anxiety information had on heart rate responses during the approach task. The multilevel model approach is a way of determining whether continuous variables (in this study, parenting styles) moderate categorical independent variables (in this study, type of information) for repeated measures designs. In this experiment, heart rate (the outcome variable) was predicted from the type of information and each of the five parenting styles. The model included all the main effects and the interactions between the type of information and each of the parenting styles. The interactions enable us to see whether the changes in anxiety beliefs were caused by the different types of information (threat, positive and none) and were influenced by the child's perceived maternal or paternal parenting style. Two analyses were performed: one for maternal data and one for paternal data.

For the maternal data the interactions between the type of information and warmth, punitive, overprotective and monitoring were all non-significant: $F_s(2, 46.47) = 1.99, 0.05, 0.87$ and 1.20 respectively. The only parenting style that significantly influenced the effect that the type of information had on heart rate was a neglectful parenting style, $F(2, 46.47) = 4.04$,

¹ Keeping the order of the boxes constant ensured that the first second and third boxes contained animals associated with different types of information across groups of children. By doing this we could be sure that if heart rates changed across the boxes for any reason other than the type of information then this would not systematically bias the results.

$p < .05$. Parameter estimates for this interaction revealed that a neglectful parenting style interacted with threat information relative to no information: $b = -8.29$ ($SE = 3.04$), $t(39.78) = -2.73$, $p < .05$, 95% confidence interval = -14.43 (lower), -2.14 (upper). Thus, a neglectful maternal parenting style (perceived by the child) caused significant decreases in heart rate. A neglectful parenting style also interacted with positive information relative to no information: $b = -5.72$ ($SE = 2.48$), $t(67.14) = -2.31$, $p < .05$, 95% confidence interval = -10.68 (lower), -0.77 (upper). For the paternal data there were no significant interactions between the type of information and any of the five parenting styles (warmth, punitive, overprotective, monitoring and neglectful), $F_s(2, 36.21) = 0.13, 0.46, 0.05, 1.40$ and 0.38 , *ns* respectively. These results indicate that a negative maternal parenting style (perceived by the child) decreases the effect that verbal information (in particular threat information) has on behavioural avoidance.

Discussion

The main finding from this experiment is that a neglectful maternal parenting style interacts with the verbal information pathway, affecting the child's physiological response to verbal threat information. These findings add to the existing body of research, demonstrating that the threat information pathway is a viable mechanism through which cognitive, behavioural and physiological responses can be changed. Theoretically, this supports Field and Cartwright-Hatton's (2007) proposition that parenting styles are not necessarily a causal influence on childhood anxiety, but rather interact with other learning processes to create anxiety cognitions, behaviours and physiological responses. Field et al. (2007) noted that a punitive parenting style would be the most likely to contribute to anxiety due to it revolving on punishment. Thus, it would be likely to generate general expectancies in the child that "bad things will happen". However, this was not observed in the current study. One possible explanation is due to the low internal consistencies for "punitiveness" within this sample. Similarly with warmth, and over-protection, it is possible that the null findings were due to low internal consistencies of the sample.

This experiment also supports existing research showing that verbal threat information is sufficient to induce behavioural avoidance (Field and Lawson, 2003), cognitions (Field et al., 2008) and physiological arousal (Field and Schorah, 2007). More important, this is the first empirical demonstration that parenting styles moderate the effect of the verbal information pathway on children's physiological responses. As such, the results suggest a causal link through which parenting styles affect children's physiological responses to what they believed was an encounter with a threat animal.

Maternal parenting style interacted with the verbal information pathway, supporting the idea that parenting practices themselves are not necessarily a causal route through which children acquire anxiety, but that they interact with other learning processes instead (Field et al., 2007; Field and Cartwright-Hatton, 2007). In particular, a negative maternal parenting style influenced the effect that both threat and positive information had on the child's responses. Paternal parenting styles had no significant effect. Interestingly, the finding that a negative maternal parenting style caused a decrease in physiological arousal during what the child believed to be an encounter with a novel animal, may initially appear an anomaly. However, Kraemer's (1992) psychobiological attachment theory suggests that biogenic amines moderate secure or insecure attachment, and attachment is linked to infant cardiac responses (Izard et al., 1991). Neglectful parenting practices can have disastrous consequences on attachment,

and affect the stress response. One particular function of secure attachment is to protect the brain from high levels of glucocorticoids, in particular those infants deemed temperamentally inhibited (Glaser, 2000). Under typical circumstances, the stress response includes raised heart rate, blood pressure and sweating as the fight or flight response becomes ready for action. This process is managed by a physiological pathway, the hypothalamic-pituitary-adrenal (HPA) axis which connects the brain to the cortisol secreting adrenal cortex. A less adaptive function of the stress response is that after repeated exposure to stressful events cortisol levels are restored due to down regulation of the HPA axis. However, cortisol affects the amygdala, which responds to threat, thus a decrease in cortisol results in a decreased fight or flight response (Hart, Gunnar and Cicchetti, 1995). This response is evident in certain parent-child attachments, and children that have suffered neglect and or abuse (Shields, Cicchetti and Ryan, 1994).

Although a neglectful maternal parenting style caused significant decreases in heart rate, it was not the case that extreme physiological responses were visible, nor is it implied that any of the children were "neglected"; but merely that there appear to be subtle decreases in children's heart rate when a neglectful maternal parenting style is perceived to be in operation.

Future research

This study was a first step towards examining the effect that parenting styles have on the physiological component of the anxiety emotion (Lang, 1968). However, because parents did not provide the information the causal relationship between a neglectful parenting style and attending to threat information is still unclear. Field and Cartwright-Hatton (2007) suggest that parents transmit anxiety through the information that they give to their children; therefore, the next step would be to look not just at an interaction between parenting styles and the processing of threat information in children, but to look for systematic differences in the information provided by anxious parents. For example, do anxious parents exaggerate threat in the verbal information that they give to their children? In the specific case of neglectful parenting, it would be interesting to see whether these parents create anxiety in their children through providing more threat information, or whether their neglectful activities imply that they do not provide enough information generally for their child to place new threat information in an appropriate context.

Clinical implications

These findings also have clinical applications, especially for preventing anxiety. In particular, a neglectful parenting style reduced the impact that both positive and threat information had on children's physiological responses to novel threats. The effect of positive information in particular implies that for a prevention program to work it may be necessary to first address parenting practices: for example, to implement a parent-training program that reduces neglectful parenting. Similarly, the results can inform therapeutic practice in the sense that neglectful parenting seems to reduce the impact of threat information. The first implication is that the verbal information pathway is likely to be less important in the aetiology of children presenting with specific fears who have mothers with neglectful parenting styles. As such, therapy should probably not be aimed at other pathways. Another possibility is that neglectful parenting is important in creating general anxiety and not specific anxiety (or fear). Field

and Cartwright-Hatton suggest that the difference between whether parenting leads to fear (anxiety about a specific object) or anxiety (anxiety about a more general set of objects) will be determined by the specificity of parenting styles. Within this context it is possible that neglectful parenting styles may provide the child with a generally impoverished environment in which many experiences are negative or threatening, which leads to general anxiety. This possibility, of course, needs to be explored empirically, but the implication would be that neglectful parenting may need to be addressed in children presenting with general anxiety.

Summary

This study examined whether parenting styles moderated the effect that verbal threat information had on the development of anxiety. The data suggest that parenting practices interact with the verbal information pathway and, in particular, a neglectful maternal parenting style appears to cause a decrease in children's physiological arousal to a novel animal.

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Appendix A: Information

Positive Information

Have you ever heard of a cuscus/quoll/quokka? Well, cuscuses/quolls/quokkas come from Australia. They are small and cuddly and their fur is really soft. They are very friendly, and live in the park, where they love playing with children and the other animals. If you went to the park, a cuscus/quoll/quokka might come out to see you, and you could stroke and cuddle it. Cuscuses/quolls/quokkas eat berries and leaves, and you could feed it out of your hand, which would make it so happy. Everyone in Australia loves cuscuses/quolls/quokkas and they like people too.

Threat Information

Have you ever heard of a cuscus/quoll/quokka? Well, cuscuses/quolls/quokkas come from Australia. They are dirty and smelly and carry lots of germs. They are very dangerous, and live in dark places in the woods, where they hunt other creatures with their long sharp teeth and claws. Cuscuses/quolls/quokkas eat other animals, so their favourite food is raw meat and they like to drink blood. If you went to the woods, a cuscus/quoll/quokka might be hiding there, and you might hear its ferocious growl. I don't know anyone in Australia who likes cuscuses/quolls/quokkas.