



Interpretation modification training reduces social anxiety in clinically anxious children



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ABSTRACT

The present study was designed to examine the effects of training in positive interpretations in clinically anxious children. A total of 87 children between 7 and 12 years of age were randomly assigned to either a positive cognitive bias modification training for interpretation (CMB-I) or a neutral training. Training included 15 sessions in a two-week period. Children with an interpretation bias prior to training in the positive training group showed a significant reduction in interpretation bias on the social threat scenarios after training, but not children in the neutral training group. No effects on interpretation biases were found for the general threat scenarios or the non-threat scenarios. Furthermore, children in the positive training did not self-report lower anxiety than children in the neutral training group. However, mothers and fathers reported a significant reduction in social anxiety in their children after positive training, but not after neutral training. This study demonstrated that clinically anxious children with a prior interpretation bias can be trained away from negative social interpretation biases and there is some evidence that this corresponds to reductions in social anxiety. This study also highlights the importance of using specific training stimuli.

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Internalizing disorders such as anxiety are estimated to occur in 5–10% of school-aged children, making them the most prevalent type of psychological disorders experienced by this population (Kashani & Orvaschel, 1990; Rapee, Schniering, & Hudson, 2009). Anxiety disorders in children are associated with significant life interference and increased risk of psychosocial implications, including poor physical health, academic difficulties, high levels of depression, substance use, poor social and interpersonal adjustment, and impaired self-competence (Strauss, Frame, & Forehand, 1987). Childhood anxiety disorders do not necessarily remit with age and if left untreated, can persist into adolescence and adulthood. They are associated with increased risk of later depression and substance abuse (Keller et al., 1992). Although treatments for child anxiety have shown good efficacy, they have clear limitations. At least 40% of children continue to have a diagnosis following

treatment (James, James, Cowdrey, Soler, & Choke, 2013). Attempts to increase effects through minor variations such as group versus individual delivery, inclusion of parents, or targeting of parent anxiety have failed to produce marked differences in outcome (Rapee et al., 2009). Therefore, it is important to find theoretical and practical innovations that might take these treatments into new directions.

According to cognitive theories of anxiety, anxious children and adults have anxiety-related schemata that direct processing resources towards threat-relevant information, resulting in cognitive biases (e.g., Williams, Watts, MacLeod, & Mathews, 1997; for a schema-based theory of childhood anxiety, see Kendall, 1985; Kendall & Ronan, 1990). This leads to an attention bias at an early stage of information processing. At later stages of information processing, the 'anxiety schema' leads to interpretation and eventually memory biases (Daleiden & Vasey, 1997; Muris & Field, 2008). These cognitive biases are believed to be content-specific; only stimuli that are associated with threat and fear are processed preferentially (e.g., Beck, 1976; Beck, Emery, & Greenberg, 1985; Schniering & Rapee, 2004). Recently, researchers have

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begun to test the causal status of these biases by manipulating attention and interpretive biases and showing resultant changes in adult anxiety (MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002; Mathews & Mackintosh, 2000). Based on these encouraging initial results, the experimental paradigms have been adapted successfully to reduce existing cognitive biases in highly anxious adolescents and adults as well as clinical populations with anxiety disorders (e.g., Amir et al., 2009; Amir, Taylor, & Donohue, 2011; Fu, Du, Au, & Lau, 2013; Salemink, van den Hout, & Kindt, 2009; See, MacLeod, & Bridle, 2009; Sportel, de Hullu, de Jong, & Nauta, 2013; Teachman & Addison, 2008). There are now several published studies that underline the efficacy of different cognitive bias modification (CBM) training formats with varying numbers of training sessions in samples with different characteristics (for reviews, see Hertel & Mathews, 2011; Mogoşă, David, & Koster, 2014). Amir et al. (2011), for instance, have found that ethnicity as well as the level of attention bias prior to CBM attention training predicted clinical treatment response. In sum, studies using CBM procedures have begun to demonstrate effects that might have promising implications for treatment. If we can affect the immediate cause of anxious emotion, then we may have a unique direction for treatment that addresses a mechanism, which is not targeted by traditional treatment strategies.

Although CBM for interpretations (CBM-I) has now been well demonstrated to reduce negative interpretations in adults (Hertel & Mathews, 2011; Menne-Lothmann et al., 2014), and there is also some evidence in adolescents (e.g., Chan, Lau, & Reynolds, 2014; Fu et al., 2013; Lau, Belli, & Chopra, 2012; Lau, Molyneaux, Telman, & Belli, 2011; Lothmann, Holmes, Chan, & Lau, 2011; Salemink & Wiers, 2011; Sportel et al., 2013; Telman, Holmes, & Lau, 2013), there are only a few published studies that evaluated this technique with pre-adolescent children (Lester, Field, & Muris, 2011a; Lester, Field, & Muris, 2011b; Muris, Huijding, Mayer, & Hameetman, 2008; Muris, Huijding, Mayer, Remmerswaal, & Vreden, 2009; Vassilopoulos, Banerjee, & Prantzalou, 2009; Vassilopoulos, Blackwell, Moberly, & Karahaliou, 2012). In two studies, Muris et al. (2008, 2009) allocated non-clinical children aged around 11 years to receive training in either positive or negative interpretations. They developed the “space odyssey paradigm” in which children were asked to imagine themselves and their parents to be astronauts who travel through space. During the task, children faced 30 ambiguous scenarios with two possible endings – a positive or a negative conclusion. Children had to choose an appropriate ending as rapidly as possible and were reinforced for a correct response. Half of the children were reinforced for providing negative endings and half for positive endings. Both studies found that children in the negative training group chose the negative endings on a later ambiguous vignettes paradigm more often than children in the positive training group. Muris et al. (2009) also found that negatively trained children showed an increase in avoidance behavior. They noted, however, that the effect sizes were fairly small, and that the hypothetical “space world” might not have generalized to daily life.

Lester et al. (2011a; 2011b) adapted the space odyssey paradigm to real life situations to study the effect of CBM-I training on interpretation bias, anxiety symptoms, behavioral avoidance, and physiological arousal. Children were assigned to receive training in either positive or negative interpretations about novel animals or social situations. For younger children (aged less than 11 years), the expected differences were found on bias change scores only in response to novel animals (Lester et al., 2011a, 2011b). For older children, expected differences were found on interpretations relevant to both novel animals and social situations (Lester et al., 2011a). Importantly, children in the negative group took

significantly longer to approach this novel animal than children in the positive group (Lester et al., 2011b). However, this effect was not replicated in another study by Lester et al. (2011a), and was not found for avoidance of social situations (Lester et al., 2011a). Despite the demonstrated differences in interpretations and behavior, no significant differences between groups were shown in either study in anxiety or heart rate. Hence, these studies point to the potential to modify interpretation biases in children, but it does not appear that such modifications have a subsequent influence on anxiety.

In contrast to these results, one study has indicated that it may be possible to alter both interpretation biases and anxiety in children with symptoms of social anxiety (Vassilopoulos et al., 2009). In this study, half the children received training intended to induce positive interpretation biases while the other half did not receive any training. During three training sessions, children faced 15 ambiguous scenarios per session with two possible endings, a positive and a negative ending. Children had to choose an appropriate ending and were reinforced for choosing the positive option. Before training and three days after training, the children completed anxiety questionnaires, performed an “ambiguous stories” paradigm with 8 stories, and took part in an anticipation test in which they were asked to indicate how they would feel in an upcoming social situation. Children in the positive training group showed reduced negative interpretations, reported less anxiety, and anticipated lower levels of anxiety in an upcoming social situation than control children. Unfortunately, the lack of an appropriate control group that received some sort of control training makes it difficult to attribute these effects to the CBM-I.

In summation, the few studies reported so far suggest that children can be trained to alter interpretations of ambiguous scenarios in much the same way as adults. Whether these alterations have subsequent effects on anxiety is much less clear. Several limitations in the research temper conclusions that can be drawn. Most importantly, none of the studies in pre-adolescent children used a clinically anxious population. Given that non-clinical children have lower levels of anxiety, it is not surprising that training in positive interpretations has limited effect. Nonetheless, training in negative interpretations should increase anxiety, and this has not yet been demonstrated. In addition, clinically anxious children may have more rigid or extreme interpretations, which may be harder to modify. Hence, the effects of CBM-I need to be replicated in clinical samples, if clinical relevance is to be demonstrated. More specific methodological limitations can be found among the existing research. Some studies involve training (and testing) related to a hypothetical “other world”, while other work utilized novel (unknown) animals. Interpretations of hypothetical or unknown stimuli may be more malleable than interpretations of stimuli of which children have existing knowledge. Hence, these factors limit generalization to daily life and might produce stronger effects than would be found with previously formed interpretations. Furthermore, all studies used only children’s self-report as an indication of anxiety. Finally, in the only study that demonstrated reductions in both interpretation bias and anxiety, there was no “control training” condition, limiting the extent to which the effects could be attributed to positive training.

Therefore, the aim of the current study was to further examine the effects of training in positive interpretations among pre-adolescent children while addressing some of the earlier limitations. First, we used a sample of clinically anxious children who were seeking treatment for their anxiety disorder. Second, training and testing utilized hypothetical scenarios that described regular daily activities that the children would have previously encountered and would continue to encounter. Third, we included

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