Performance-Based Interpretation Bias in Clinically Anxious Youths: Relationships With Attention, Anxiety, and Negative Cognition

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This preliminary investigation sought to examine basic interpretive biases, as assessed via performance-based means, in the context of anxious symptomatology, attention, and negative cognition in children and adolescents. At a single assessment, 26 youths diagnosed with primary separation anxiety, social phobia, or generalized anxiety disorder completed performance-based assessments of interpretation and attention. Youths and parents also completed diagnostic interviews and youths completed a measure of negative self-statements. Components of interpretation (threat-valence judgments and speed of responding) were examined, and interpretation was explored as a correlate of youth anxiety, attention bias, and negative self-statements. Results found percentage of negative interpretations endorsed as the strongest predictor of anxiety symptoms; this index was also correlated with attention bias. Slower rejection of benign interpretations was also associated with youth-reported negative self-statements. This initial investigation provides support for a relationship between interpretation bias and anxiety and preliminary evidence for a relationship between attention and interpretation biases. Continued research dismantling the stages of basic cognition within the chain of information processing may provide a better understanding of the mechanisms underlying anxiety disorders in youths and lead to continued development and refinement of cognitive interventions.

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ANXIETY DISORDERS ARE DISABLING, distressing, and the most prevalent mental health problem in children and adolescents (25%; Beesdo, Knappe, & Pine, 2009; Bell-Dolan, Last, & Strauss, 1990; Schaffer, Fisher, Dulcan, & Davies, 1996). Theoretical models of youth anxiety implicate the role of basic cognitive processing biases as underlying mechanisms in the development and maintenance of anxiety disorders (e.g., Crick & Dodge, 1994; Daleiden &Vasey, 1997; Muris & Field, 2008). Typically, these models propose that, first, individuals encode or attend to threatening information in their environment (i.e., attention bias), and second, make threatening or negative interpretations, or attributions, to ambiguous information (i.e., interpretation bias). These first two stages of information processing (IP) are proposed to impact higher levels of processing until the youth eventually engages in anxious behavior (e.g., avoidance, reassurance seeking). In the last two decades, the majority of IP studies have focused on attentional biases. However, understanding basic interpretive biases may provide useful empirical information regarding IP in youth anxiety, including the chain of processing and predictive value of various IP stages on anxiety, which may inform how best to approach the modification of IP biases with cognitive bias modification (CBM) interventions.

Interpretation is considered the second stage of cognitive processing, proposed to occur immediately after attention (Crick & Dodge, 1994; Daleiden

&Vasey, 1997), and includes making attributions to ambiguous information. Questionnaire and vignette studies with adults have found anxious individuals to favor negative interpretations (Huppert, Foa, Fur, Filip, & Mathews, 2003; Stopa & Clark, 2000) and lack a benign interpretation bias (Constans, Penn, Ihen, & Hope, 1999; Hirsch & Mathews, 2000) as compared to nondiagnosed controls. Self-reported negative interpretations have also mediated the effect of social anxiety on state anxiety in adults (e.g., Beard & Amir, 2010). In order to assess basic interpretive biases, recent studies have utilized performance-based interpretation paradigms, which present stimuli very quickly (typically 500 milliseconds [ms]) and ask individuals to interpret or make appraisals of related ambiguous information in a time-limited way (typically no longer than 4000 ms). Performance-based interpretation studies have demonstrated that anxious adults make more negative or threatening interpretations, and also respond more quickly when making negative interpretations, than nonanxious controls (e.g., Amir, Beard, & Przeworski, 2005). This suggests that anxious adults' quick responses to ambiguity with negative attributions may be fast, automatic, and difficult to inhibit, as compared to a relative slower speed of assigning benign attributions.

Studies have shown that training interpretation towards benign attributions decreases attention bias towards threat (e.g., Amir, Bomyea, & Beard, 2010), and that reductions in interpretation bias during these trainings mediate the relationship between initial interpretation bias and pre-to-post treatment anxiety reduction (e.g., Beard & Amir, 2008). These findings suggest that interpretation plays a role in maintaining anxiety, and that its modification can cascade downstream to impact attention, as well as upstream to impact anxiety symptoms. The adult literature also suggests that later levels of cognitive processing may be implicated in depressive symptom presentation (e.g., Mogg & Bradley, 2005); therefore, interpretation may be a particularly relevant link in the IP chain in consideration of the high level of depressive symptom co-occurrence and diagnostic comorbidity within anxious samples.

In the area of youth interpretation, the majority of published studies examine youth-reported negative self-statements (e.g., Kendall & Treadwell, 2007; Micco & Ehrenreich, 2008; Schniering & Rapee, 2002), multiple-choice selection of responses in interpretation of ambiguous vignettes (e.g., Barrett, Rapee, Dadds, & Ryan, 1996; Miers, Blote, Bogels, &Westenberg, 2008), and time-unlimited tasks, such as homophone identification (e.g., Waters, Wharton, Zimmer-Gembeck, & Craske, 2008) and in vivo selection of card stimuli (e.g., Hadwin, Frost, French, & Richards, 1997). These techniques do not necessarily target the early aspects of interpretation (i.e., under 3000 or 4000 ms), as self-reports of negative or "automatic" thoughts and time-unlimited tasks theoretically occur at slower, more controlled levels of processing within proposed IP frameworks (Crick & Dodge, 1994; Daleiden & Vasey, 1997). Conversely, basic interpretive processes are presumed to occur quickly and immediately after information is encoded, with individuals potentially unaware of the attributions being made. It is likely that performance-based assessment of interpretation might provide information about youth cognitive biases that self-reported (or other time-unlimited) measures might not provide: first, higher levels of processing may not necessarily reflect automatic and fast interpretation; second, there is greater potential for response or social desirability biases that may impact youth performance on questionnaires asking them to indicate the content and frequency of negative thoughts.

To date, three studies have utilized performance-based interpretation paradigms to specifically test interpretive biases in anxious youths. In-Albon and colleagues (In-Albon, Dubi, Rapee, & Schneider, 2009; In-Albon, Klein, Rinck, Becker, & Schneider, 2008) developed and tested a novel pictorial assessment of interpretation, whereby youths responded to social- or separation-themed pictures in a time-limited manner. The measure appeared to demonstrate good initial reliability and validity, although in the second investigation (In-Albon et al., 2009), anxious youths did not differ from nonanxious control youths in their interpretations of ambiguous pictures. Another study of performance-based interpretations utilized a single-target implicit association test, with adolescent participants categorizing socially relevant words as linked to positive or negative outcomes (de Hullu, de Jong, Sportel, & Nauta, 2011), whereby adolescents with higher self-reported social anxiety indicated significantly more social cue words as related to negative outcomes than youths self-reporting low social anxiety. Although both of these tasks used performance-based assessment as a way of speeding youth responses to be more consistent with the conceptualization of interpretation as a basic, early, and less-controlled cognitive process, the authors did not report data regarding whether youths responded with differential speed depending on the stimuli presented.

In addition to questions about whether anxious youths make negative interpretations more quickly than benign interpretations, other mechanistic questions about cognitive biases in anxious youths have not yet been explored. Relationships between basic attention and interpretation biases in anxious youths have not been well studied, and it is unclear whether modifying one type of bias would necessarily result in