Interpretation bias for uncertain threat: A replication and extension

Mary E. Oglesby [a], Amanda M. Raines [a], Nicole A. Short [a], Daniel W. Capron [a, b], Norman B. Schmidt [a, *]

[a] Florida State University, 600 W College Ave, Tallahassee, FL 32306, USA
[b] University of Southern Mississippi, 118 College Dr, Hattiesburg, MS 39406, USA

ABSTRACT

Background: Intolerance of uncertainty (IU) has been proposed as an important transdiagnostic variable within various anxiety-related disorders. Research has suggested that individuals high in IU may interpret ambiguous information in a more threatening manner, suggesting a negative interpretation bias for uncertain information. However, interpretation biases within IU have not been adequately tested in the literature.
Methods: The current study evaluated negative interpretation biases for uncertain information by directly measuring an individual's interpretations of ambiguous information across two samples. Participants consisted of 76 (Study 1; 72.4% female) and 31 (Study 2; 81% female) undergraduate students.
Results: Results indicated that individuals high in IU interpret ambiguous scenarios as more threatening compared to negative and/or positive scenarios ($\beta = .45$, $p = .02$). In addition, individuals high in IU showed a negative interpretation bias for ambiguous information, but not benign information (Study 1: $\beta = -.40$, $p < .001$; Study 2: $\beta = -.57$, $p = .002$).
Limitations: Future research should attempt to replicate these findings within clinical populations. In addition, future work would benefit from the inclusion of behavioral assessments of IU.
Conclusions: These findings are the first to detect the presence of a negative interpretation bias for uncertain information among individuals high in IU utilizing a task designed to directly measure an individual's interpretation of information. Given the efficacy and low economic burden associated with interpretation bias modification protocols, and the transdiagnostic nature of IU, targeting IU within these protocols could have a tremendous public health impact.

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1. Introduction

According to cognitive models of anxiety, information processing plays a central role in the development and maintenance of anxiety disorders (Beck & Clark, 1997). More specifically, anxious individuals tend to selectively process threat cues from their environment and overestimate the likelihood of their occurrence (Clark & Steer, 1996), which may lead to the creation of schemas that further influence future information processing (Beck & Clark, 1997). There is dispute over which types of information processing may be most critical to anxiety, but interpretative biases are often indicated as an important cognitive vulnerability factor for anxiety (MacLeod & Mathews, 2012; Ouimet, Gawronski, & Dozois, 2009).

Interpretation bias is defined as the tendency to interpret novel information from the environment as negative (Beard & Amir, 2008). Prior research has reliably found support for a negative interpretation bias of threat-relevant innocuous information among anxious individuals (Amir, Beard, & Bower, 2005; Eysenck, Mogg, May, Richards, & Mathews, 1991; Ouimet et al., 2009). Furthermore, experimental studies have suggested threat-relevant interpretation biases as being partially involved in the development of anxiety psychopathology (Mathews & Mackintosh, 2000; Mathews, Ridgeway, Cook, & Yiend, 2007; Salemink, van den Hout, & Kindt, 2007).

Given previous research implicating interpretation biases in the development of anxiety disorders, it is important to better understand the role of interpretation biases in not only anxiety disorders, but also individuals who are at risk of developing an anxiety disorder. Specifically, researchers have begun to explore the association of interpretation biases with anxiety-related vulnerability

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* Corresponding author. Department of Psychology, Florida State University, 1107 W. Call St., Tallahassee, FL 32306, USA.
E-mail address: schmidt@psy.fsu.edu (N.B. Schmidt).

factors. This is crucial given the importance and need for the development of preventative interventions aimed at reducing anxiety-related risk factors (Zvolensky, Schmidt, Bernstein, & Keough, 2006). To date, the interpretation bias literature has mainly focused on negative interpretation biases within anxiety sensitivity (AS), a well-known risk factor for anxiety psychopathology (Schmidt, Zvolensky, & Maner, 2006). For example, using a scenarios task where individuals high and low in anxiety sensitivity (AS) were asked to rank three alternative explanations (one negative, one positive, and one neutral) for why a vague panic-related event may have occurred (e.g., "You notice that your heart is beating quickly and pounding"), Teachman (2005) found individuals elevated in AS to be more likely to interpret these vague situations in a catastrophic manner (e.g., "Because there is something wrong with your heart") as compared to individuals low in AS. A series of recent studies have extended these findings by successfully modifying a negative interpretation bias for AS utilizing Cognitive Bias Modification (CBM) paradigms (Capron & Schmidt, 2014; MacDonald, Koerner, & Antony, 2013; Steinman & Teachman, 2010). For example, utilizing their CBM for interpretation bias (CBM-I) paradigm, Capron and Schmidt (2014) found a single-session intervention to be successful in reducing overall AS at post-treatment and these reductions were maintained through one-month post-intervention.

Intolerance of uncertainty (IU) is an additional vulnerability factor that may contribute to negative interpretation biases within anxiety. IU is often conceptualized as "a dispositional characteristic resulting from negative beliefs about uncertainty and its implications" (Carleton, Fetzner, Hackl, & McEvoy, 2013; Dugas & Robichaud, 2007). Individuals elevated in IU consider the possibility of a negative event occurring as threatening and intolerable, despite the actual probability of it happening (Carleton, Norton, & Asmundson, 2007). Intolerance of ambiguity, a construct related to IU, is often conceptualized as ambiguity in the 'here and now,' whereas IU is more focused on threatening interpretations of future uncertainty (Carleton, 2012; Grenier, Barrette, & Ladouceur, 2005). Although related, research has suggested that IU, in comparison to intolerance of ambiguity, is more closely associated with various psychopathology and is therefore a more relevant construct of focus (Carleton, 2012). Historically, IU was thought to have a specific relationship with generalized anxiety disorder (GAD; Dugas, Schwartz, & Francis, 2004), but recent research has begun to highlight the relationship between IU and a variety of anxiety-related disorders. Specifically, the extant literature has found IU to be associated with symptoms of social anxiety disorder (SAD), obsessive-compulsive disorder (OCD), panic disorder, and post-traumatic stress disorder (PTSD) (Boelen & Reijntjes, 2009; Carleton et al., 2013; Fetzner, Horswill, Boelen, & Carleton, 2013; Holaway, Heimberg, & Coles, 2006; Koerner & Dugas, 2008). These findings have lead researchers to propose IU as an important transdiagnostic individual difference variable within anxiety-related disorders (Mahoney & McEvoy, 2012; McEvoy & Mahoney, 2012).

Given the transdiagnostic nature of IU (Carleton, 2012), researchers have begun to investigate the role of IU in the development and maintenance of anxiety-related disorders. Some have theorized that these distorted beliefs about the negative nature of uncertainty lead to biased information processing abilities, incorrect appraisals of elevated threat, and reduced coping strategies in the face of uncertainty (Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994). Consistent with this, (Hedayati, Dugas, Buhr, & Francis, 2003, November) found that individuals high in IU interpret uncertain information in a more threatening manner when compared to negative and positive information. This finding, combined with theoretical understandings of IU, suggests that IU may influence anxiety via biased information processing.

Given the significant relations between IU and various anxiety-related disorders (Carleton, 2012; Ladouceur, Talbot, & Dugas, 1997; Mahoney & McEvoy, 2012) and prior work suggesting individuals elevated in IU interpret uncertainty more negatively, investigating negative interpretation biases associated with IU is an important next step in the interpretation bias literature. Indeed, establishing such biases is a necessary step before attempting to modify this bias. However, only two studies to date have examined whether or not a negative interpretation bias is evident in individuals high in IU (Dugas et al., 2005; Koerner & Dugas, 2008). Both studies found individuals high in IU (compared to low IU) reported greater concern over uncertain situations in a vignettes task within a nonclinical undergraduate sample. In this task, elevated concern over uncertain scenarios was considered to reflect a negative interpretation of the situation. While these results are promising, rating the level of concern is not a direct assessment of the presence of a negative interpretation bias. Instead, this method may be merely capturing increased emotional arousal, but not an automatic, negative interpretation of uncertain information per se. Therefore, a more objective evaluation of a negative interpretation bias for uncertain information is needed. Specifically, a task designed to directly measure an individual's automatic interpretations of information would provide vital information to aid in the creation CBM-I protocols.

The current study had two primary aims. First, we sought to replicate previous research demonstrating the presence of a negative interpretation bias of uncertain information among individuals high in IU utilizing the vignettes task from Dugas et al. (2005). Consistent with prior research (Dugas et al., 2005), we expected to find a significant association between IU and elevated concern over uncertain scenarios (Study 1). Second, we sought to extend these findings by investigating whether or not individuals high in IU possess a negative interpretation bias for uncertain information utilizing a task designed to directly measure an individual's interpretation of information. Specifically, this task measures whether an individual interpreted an uncertain situation in a negative or neutral manner, not solely their level of concern about the event. Based on prior research (Beard & Amir, 2008; Dugas et al., 2005), we hypothesized that individuals high in IU (compared to those low in IU) would display a negative interpretation bias for uncertain information (Study 1). Finally, given the paucity of research examining negative interpretation biases for uncertain information, we sought to replicate this finding within an independent sample utilizing disparate scenarios (Study 2). Given the novel nature of our task, we were interested to see if this effect would generalize to new stimuli within an independent sample. Lastly, negative affect was included as a covariate in Study 1 to be consistent with prior research utilizing the scenarios task (Dugas et al., 2005; Koerner & Dugas, 2008). However, negative affect was not included as a covariate in Study 2 and 3 given that covariates have not been used when investigating interpretation biases in the extant literature (Amir et al., 2005; Capron & Schmidt, 2014; MacDonald et al., 2013).

2. Study 1: method

2.1. Participants

Participants included 76 undergraduate students recruited from a large southern university. Participants were selected based on their responses to the Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994). Specifically, half of the sample was selected for scoring 1.5 standard deviations above the non-clinical mean on the IUS, whereas the other half was unselected (i.e., not required to