Information Seeking in Individuals Intolerant of Uncertainty

BY

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THESIS

Submitted as partial fulfillment of the requirements
for the degree of Master of Arts in Psychology
in the Graduate College of the
University of Illinois at Chicago, 2017

Chicago, Illinois

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This thesis is dedicated to my parents, Michael Ranney and Shelley Million, who taught me all the most important things in life, including how to eat, how to laugh, how to question, and how to show up for the people you care about.

ACKNOWLEDGEMENTS

First and foremost, thank you to my advisor, Evi Behar, for helping me to challenge myself to produce the best work that I can, and for helping me to believe that I can achieve the goals that I set. I have become a better critical thinker because of you, and for that I am profoundly grateful. I am also thankful for my excellent committee members (Robin Mermelstein and Stew Shankman) who provided invaluable guidance and feedback on this project. Additionally, I could not have completed this thesis without a team of superb research assistants, Marilyn Coley, Cynthia Romero, Sara Izquierdo, Lauren Lucas, and Manali Chingre. I would also like to thank everyone from my lab, including Alex Jendrusina, Libby Stevens, and Meghan Fortune for helping me develop this project—through lively debates in lab meetings, as well as additional guidance, support, and cheerleading along the way! Additionally, I must thank Greg Bartoszek, whose feedback and contributions in brainstorming greatly enhanced this project. Finally, I would like to thank my family and friends. Graduate school can be lonely sometimes, but you remind me that I am loved, supported, and connected. I owe everything to you.

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LIST OF ABBREVIATIONS

ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
BDI-II	Beck Depression Inventory- II
CI	Confidence Interval
CS	Conditioned Stimulus
FACES	Facial Expression Coding System
GAD	Generalized Anxiety Disorder
ICC	Intraclass Correlation
IU	Intolerance of Uncertainty
IUM	Intolerance of Uncertainty Model
IUS	Intolerance of Uncertainty Scale
MANOVA	Multivariate Analysis of Variance
NA	Negative Affect
OCD	Obsessive Compulsive Disorder
PA	Positive Affect
PA	Prospective Anxiety
PANAS	Positive and Negative Affect Schedule
PSWQ	Penn State Worry Questionnaire
STI	Sexually Transmitted Infection
SUDS	Subjective Units of Distress Scale
UCR	Unconditioned Response
UCS	Unconditioned Stimulus

SUMMARY

The intolerance of uncertainty model (IUM) of worry posits that individuals worry as a means to cope with the discomfort they feel when outcomes are uncertain, but there have been few experimental studies that investigate the causal relationships between intolerance of uncertainty, situational uncertainty, and worry. Furthermore, existing studies have failed to control for the likelihood of future negative events occurring, introducing an important rival hypothesis to explain past findings.

In the present study, we recruited individuals with low and high trait prospective anxiety (PA), which is a component of intolerance of uncertainty that reflects discomfort with uncertainty and the desire for more certainty/information. We sought to examine whether high trait PA would predict more information seeking behavior, and whether trait PA would predict differences in how participants react (emotionally, cognitively, and behaviorally) to a manipulation of situational uncertainty. In order to improve upon limitations in past research, we also sought to hold constant the occurrence and likelihood of the upcoming stressor in order to better isolate the causal role of situational uncertainty. All participants were informed that they would be exposed to two emotionally upsetting film clips and asked to write a list of questions about the clips that they wanted to have answered prior to watching the film clips. We randomly assigned participants either to have their questions fully answered and given specific information about the upcoming film clips (situational certainty) or to not have their questions answered and not receive information about the upcoming film clips (situational uncertainty). All participants were then instructed to think about the upcoming film clips during a five-minute anticipation period. Finally, participants viewed the two emotionally upsetting film clips, and we measured their visual attention and emotional reactivity to these film clips.

We found that although individuals high in trait PA evidenced more information seeking behavior and reported a higher degree of belief that being provided with detailed information about the upcoming stressor would make them feel at ease, they did not experience a decrease in distress or worry upon being provided with more information, during anticipation of the film clips, or during the film clips themselves. Our results demonstrate that heightened distress regarding negative events may be more central than intolerance of uncertainty in the maintenance of worry.

I. INTRODUCTION

Theoretical models of generalized anxiety disorder (GAD) have relied on classic conceptualizations of fear to understand the nature and experience of worry. Mowrer's (1960) two-stage model of fear conceptualizes fear acquisition and maintenance in terms of both classical and operant conditioning. In the first stage, fear is acquired through classical conditioning in that a neutral stimulus (CS) is paired with an unconditioned stimulus (UCS) that naturally evokes a fear response (UCR). In the second stage, fear is maintained through operant conditioning in that individuals avoid the feared stimulus, leading to negative reinforcement of the avoidance behavior, which successfully leads to a reduction in anxious states. Theories of GAD have relied on Mowrer's second stage to understand how worry is maintained over time.

The avoidance model of worry and GAD (Borkovec, Alcaine, & Behar, 2004) posits that GAD differs from many other anxiety disorders in that there is no *motoric* avoidance of a feared stimulus but instead *cognitive* avoidance that manifests itself as worry. According to this model, worry is utilized by individuals with GAD to avoid somatic experiences of anxiety. Worry is characterized by a predominance of verbal-linguistic activity, whereas other states, such as relaxation (Borkovec & Inz, 1990) and trauma recall (Behar, Zuellig, & Borkovec, 2005), are characterized by a predominance of imagery. In turn, verbal-linguistic processing of fearful material is associated with reduced cardiovascular responding, whereas imagery-based processing of fearful material is associated with enhanced cardiovascular response (Vrana, Cuthbert, & Lang, 1986). Indeed, worry has been shown to suppress the somatic experience of anxiety. For example, Borkovec and Hu (1990) found that speech-anxious participants who engaged in worry prior to presentations of a phobic image displayed lower cardiovascular response to those images relative to participants who engaged in relaxation or neutral thinking.

Other investigations have likewise found that a period of worry is associated with inhibited affective experiences during subsequent emotion-inducing tasks such a trauma recall (Behar, Zuellig, & Borkovec, 2005) and depressive rumination (McLaughlin, Borkovec, & Sibrava, 2007).

According to classic theories of fear extinction (Foa & Kozak, 1986), an individual must experience the stimulus, fear response, and meaning propositions in order for extinction to occur. During worry, individuals do not fully experience the fear response, and thus the fearful meaning of the feared stimulus is maintained (Borkovec, Alcaine, & Behar, 2004). This avoidance of the unpleasant somatic experience of anxiety negatively reinforces worry, and worry is even further negatively reinforced because the events that individuals worry about often do not transpire (Borkovec, Hazlett-Stevens, & Diaz, 1999), promoting the subjective perception that worry prevents negative outcomes from occurring. Supporting the notion that worry is perceived as beneficial, individuals with GAD are more likely to hold positive beliefs that worry can help them cope with negative emotions (Borkovec & Roemer, 1995; Penney, Mazmanian, & Rudanycz, 2013).

Another theoretical conceptualization of GAD has focused on the role of intolerance of uncertainty (IU; Andrews & Borkovec, 1988; Dugas, Buhr, & Ladouceur, 2004; Dugas, Gagnon, Ladouceur, & Freeston, 1998). IU is an individual differences variable depicting an individual's appraisal of uncertain or ambiguous situations as threatening; those with high IU respond negatively to uncertain situations on a cognitive, emotional, and behavioral level (Buhr & Dugas, 2002; Dugas, Buhr, & Ladouceur, 2004; Dugas & Koerner, 2005). Interest in the construct of IU has increased due to its transdiagnostic properties. IU predicts psychopathological symptoms in GAD (e.g., Gentes & Ruscio, 2011), obsessive compulsive disorder (OCD; Steketee, Frost, &

Cohen, 1998), social anxiety disorder (e.g., Boelen & Reijntjes, 2009), depression (e.g., de Jong-Meyer, Beck, & Riede, 2009), panic disorder, and agoraphobia (McEvoy & Mahoney, 2011). IU is also strongly associated with the cognitive process of worry (Dugas, Freeston & Ladouceur, 1997; Freeston, Rheaume, Letarte, Dugas & Ladoucer, 1994). The intolerance of uncertainty model (IUM) of worry posits that individuals worry as a means to cope with the discomfort they feel when outcomes are uncertain (Behar, DiMarco, Hekler, Mohlman, & Staples, 2009). As proposed by this model, high IU and high situational uncertainty might interact to produce especially high, disruptive levels of worry. However, currently there is insufficient empirical support for this interactional hypothesis.

IU has traditionally been viewed as a trait-like feature (Mahoney & McEvoy, 2012), but has also been manipulated experimentally (Ladouceur, Gosselin, & Dugas, 2000; Rosen & Knäuper, 2009) and decreases in response to psychotherapy for GAD that seeks to reduce IU (Boswell, Thompson-Hollands, Farchione, & Barlow, 2013); Dugas & Ladouceur, 2000). Furthermore, IU has been found to mediate the relationship between neuroticism and worry (McEvoy & Mahoney, 2013). These findings add to growing evidence that IU might play a causal role in maintaining worry. However, extant research has not yet shown conclusively that IU generates and sustains worry in individuals with GAD. The vast majority of research on IU as it relates to GAD utilizes correlational rather than experimental designs, and thus causal relationships and mechanisms involving both IU and situational uncertainty have remained largely untested.

Woody and Rachman (1994) offer a perspective on GAD that might enrich our understanding of the role that IU plays in the maintenance of worry. They assert that GAD stems from a search for safety signals, and that this search is ultimately unsuccessful due to the

individual's bias toward perceiving and interpreting threat, even in ambiguous situations (e.g., Butler & Mathews, 1983; 1987; Dugas et al., 2005). Because uncertainty is viewed as unacceptable and threatening, one way in which individuals with GAD might respond to uncertainty is to search for information in order to combat the threatening value associated with uncertainty. Relative to non-anxious controls, individuals with GAD are more likely to seek reassurance from others (arguably a form of safety information) (Beesdo-Baum et al., 2012; Cougle et al., 2012). Woody and Rachman (1994) theorize that these attempts to find safety only offer temporary relief from anxiety; eventually, the safety signal's effect will wear off, and the individual's attention will be drawn toward any number of new stimuli that could be perceived as threatening. In support of their safety signal perspective, Woody and Rachman note that unpredictable or irregular aversive stimuli inhibit the establishment of a dependable safety signal (Jacobs & Lolordo, 1977). Uncertain situations or reminders of uncertainty, which individuals with GAD typically find highly aversive, often arise unpredictably and irregularly; thus, it may be difficult to identify a stable safety signal. Additional research is needed to understand the ways in which the search for safety signals manifests in GAD. The IU literature suggests that limiting uncertainty through information seeking may be one way in which individuals with GAD search for safety.

Information seeking behavior as a consequence of high IU has thus far only been examined in the health literature. Rosen and Knäuper (2009) investigated the effects of both IU and situational uncertainty on information seeking using a task in which participants read a medical description of a fictitious sexually transmitted infection (STI). They randomly assigned participants to experience either high or low IU through false feedback about their trait level of IU. They also randomly assigned participants to experience situational certainty or uncertainty;

participants in the situational certainty condition read a description of the STI that led them to be certain they did not have the infection, whereas participants in the situational uncertainty condition read a description of the STI that led them to be uncertain about whether they might have the infection. Compared to all other groups, participants assigned to experience both high IU *and* situational uncertainty sought more information about the fictitious health risk and reported higher levels of state worry. The authors concluded that the co-occurrence of high IU and situational uncertainty might be a powerful combination that predicts higher information seeking behavior and higher worry. Importantly, however, the investigators did not rule out the important rival hypothesis (identified by Oglesby & Schmidt, in press) that the mere anticipation of a negative event (i.e., having an STI) might have led to these effects. Because the situational uncertainty condition induced both uncertainty *and* the anticipation of a negative event, it is impossible to isolate the effects of situational uncertainty. Additionally, a task involving a health risk may not be as personally relevant for those with GAD, as health concerns are not among the main topics of worry for this population (Hoyer, Becker, & Roth, 2001).

In another experimental study, Ladouceur, Gosselin, and Dugas (2000) manipulated IU via a gambling task. Participants randomly assigned to the condition designed to promote IU (high IU) were told that if they did not succeed in the game, a certain charitable organization would not receive any money, whereas participants randomly assigned to the condition designed to minimize IU (low IU) were told that the charity would receive money regardless of their success in the game. Participants in the high IU condition reported higher intolerance of uncertainty and higher levels of state worry during the gambling task than did participants in the low IU condition. Although this experiment showed a causal relationship between IU and state worry, it also does not rule out Oglesby and Schmidt's (in press) proposed rival hypothesis that

the anticipation of a negative event (i.e., being responsible for a charitable organization not receiving money) might have led to increased state worry during the gambling task. Because the high IU condition induced both high IU *and* the anticipation of a negative event, it is impossible to isolate the effects of IU. In addition, this investigation did not include a measure of information seeking, which may represent an important distinguishing factor between those high and low in IU.

Noting that the anticipation of a threat was a potential confound in existing experimental research on IU, Oglesby and Schmidt (in press) sought to control for this potential confound in an investigation of the relationship between trait IU and situational uncertainty using a speech giving task. They randomly assigned participants to be told either that they would be giving a speech (low situational uncertainty with threat), or that a coin toss would decide whether they would give a speech (high situational uncertainty with threat). This design allowed them to compare low and high situational uncertainty while holding threat constant across conditions. Results indicated that participants high in trait IU evidenced no difference in anticipatory state anxiety whether they had been assigned to high or low situational uncertainty over a future threat. Thus, individuals with high trait IU subjectively report that uncertainty causes them distress, but they do not actually evidence higher state anxiety when faced with uncertain versus certain threatening events. Importantly, although Oglesby and Schmidt (in press) attempted to hold constant the presence of threat, the *likelihood* of that threat occurring varied systematically with situational uncertainty, making comparisons between high and low situational uncertainty inappropriate. Therefore, from this study, it remains unclear whether participants with high trait IU react differently to high versus low situational uncertainty regarding a future threat when the likelihood of that future event occurring is held constant.

In the present study, we recruited individuals with low and high trait prospective anxiety (PA), which is a component of intolerance of uncertainty that reflects discomfort with uncertainty and the desire for more certainty/information. We sought to examine whether high trait PA would predict more information seeking behavior, and whether trait PA would predict differences in how participants react (emotionally, cognitively, and behaviorally) to a manipulation of situational uncertainty. In order to improve upon limitations in past research, we also sought to hold constant the occurrence and likelihood of the upcoming stressor in order to better isolate the causal role of situational uncertainty. All participants were informed that they would be exposed to two emotionally upsetting film clips and asked to write a list of questions about the clips that they wanted to have answered prior to watching the films. We randomly assigned participants either to have their questions fully answered and given specific information about the upcoming film clips (situational certainty) or to not have their questions answered and not receive information about the upcoming film clips (situational uncertainty). All participants were then instructed to think about the upcoming film during a five-minute anticipation period. Finally, participants viewed the two emotionally upsetting film clips about which they had previously been informed, and we measured their visual attention and emotional reactivity to these clips. First, we predicted that participants high in trait PA would seek more information than would participants low in trait PA. Second, we predicted that participants high in trait PA who experienced situational uncertainty would maintain a high level of worry in anticipation of the upcoming film clips; in contrast, participants high in trait PA who had situational certainty would initially feel less worried, but then experience an increase in worry as they experienced a renewed sense of uncertainty as time elapsed (as per Woody & Rachman, 1994). Third, consistent with theories of worry highlighting the role of emotional avoidance, we predicted that

participants who worried more prior to the film clip would evidence (a) less visual attention while watching the film clips and (b) reduced emotional reactivity while watching the film clips.

II. METHODS

A. Design

A 2 (Prospective Anxiety: high, low) X 2 (Condition: certainty, uncertainty) between-subjects design was utilized.

B. Participants

Undergraduate students both low and high in prospective anxiety (PA) were pre-selected from the participant pool at a large, public urban university over the course of five semesters, with a total of 2,932 students who completed the IUS as a screening measure. Potential participants were administered the Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2002) during a departmental screening procedure and were invited to participate if their score on the PA subscale was either greater than or equal to one standard deviation above the participant pool mean, or greater than or equal to one standard deviation below the participant pool mean. A total of 1,092 participants were invited to participate.

On the day of the laboratory visit, participants were re-administered the IUS in order to ensure that their PA subscale scores were still within the acceptable range for inclusion in the study. As a result of this re-administration of the IUS, 85 participants were excluded from analyses. Our final sample of participants ($N = 90$, mean age = 19.27 [$SD = 1.66$], 56 females) was racially/ethnically diverse, consisting of 16.7% Caucasian, 8.9% African American, 32.2% Latino/Hispanic, 30.0% Asian / Pacific Islander, 2.2% Middle Eastern, and 6.7% multiracial/multiethnic participants, with 3.3% of participants not reporting their race/ethnicity (see TABLE I). Participants included in this study for final analysis all were either a standard deviation above or below the participant pool mean (PA scores of either 12 and below or 25 and above). Participants received course credit for participation.

TABLE I. DESCRIPTIVE STATISTICS

	Low Trait PA		High Trait PA	
	Situational Certainty (*n* = 23)	Situational Uncertainty (*n* = 18)	Situational Certainty (*n* = 25)	Situational Uncertainty (*n* = 24)
Age *M* (*SD*)	19.05 (1.17)	18.94 (1.03)	19.56 (2.27)	19.41 (1.68)
Females (*n*)	15	10	17	14
Race/Ethnicity *(n)*				
Caucasian	6	2	4	3
African American	2	4	2	0
Hispanic	9	5	8	7
Asian/Pacific Islander	1	5	9	12
Middle Eastern	1	1	0	0
Multiracial	4	0	1	1

Note. No variables significantly differed by group or condition.

C. Measures

1. Subjective Units of Distress Scale. Participants reported their subjective distress on the subjective units of distress scale (SUDS) on a 0-100 point scale (0 = "totally relaxed," 100 = "highest distress/fear/anxiety/ discomfort that you have ever felt").

2. Penn State Worry Questionnaire. The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item self-report measure designed to assess the frequency and intensity of worry. It has been found to have high internal consistency (α = .91-.95) and good retest reliability both immediately (r = .92) and at four weeks from initial assessment (r = .74). Correlations between the PSWQ and measures of anxiety, depression, and

emotional control supported the convergent and discriminant validity of the measure (Brown, Antony, & Barlow, 1992). We administered the PSWQ to ensure that trait levels of worry were equivalent across randomly assigned conditions. Internal consistency of the PSWQ for our sample was excellent (α = .94).

3. Positive and Negative Affect Schedule. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a 20-item self-report measure consisting of 10 positively-valenced and 10 negatively-valenced adjectives that assess positive affect (PA) and negative affect (NA). The PANAS has demonstrated good internal consistency in an undergraduate population (PA α = .89, NA α = .85) for momentary assessment of affect. Retest reliability is moderate for both subscales (PA α = .54, NA α = .45) for momentary assessment of affect. Convergent (Bagozzi, 1993) and discriminant (Bleidorn & Peters, 2011; Watson, Clark, & Tellegen, 1988) validity of both PA and NA have also been documented. Internal consistency of the PA and NA subscales for our sample was good at all three time points when assessed (PA α = .88-.90, NA α = .83-.88).

4. Beck Depression Inventory- II. The Beck Depression Inventory- II (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item self-report measure that assesses features related to depression over the past two weeks. The BDI-II has high internal consistency in undergraduate samples (α = .90; Osman et al., 1997) and excellent retest reliability over durations varying from one to 12 days after initial assessment in a university counseling center sample (r = .82-1.00; Sprinkle et al., 2002). Convergent and discriminant validity of the BDI-II have been documented (Arnarson, Ólason, Smári, & Sigurđsson, 2008). Internal consistency of the BDI-II for our sample was excellent (α = .95).

5. Intolerance of Uncertainty Scale. The Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2002) is composed of 27 items measuring negative beliefs about and reactions to uncertainty. The English version is based on the original French version (Freeston et al., 1994). Internal consistency (α = .94) and retest reliability (r = .74 over five weeks) of the English version are good (Buhr & Dugas, 2002). Evidence of convergent and discriminant validity have been reported in multiple populations (Buhr & Dugas, 2002; Carleton, Norton, & Asmundson, 2007; Norton, 2005). The IUS includes four factors: (1) that uncertainty is unacceptable and should be avoided; (2) that uncertainty reflects badly on an individual; (3) that uncertainty leads to frustration and stress; and (4) that uncertainty makes an individual unable to take action (Buhr & Dugas, 2002; Freeston et al., 1994). More recently, the scale has been shortened to include only two subscales: (1) prospective anxiety, which involves anticipation of uncertainty, and has been found to be uniquely associated with GAD and OCD; and (2) inhibitory anxiety, which involves the inhibition of action or experience in response to uncertainty, and has been found to be uniquely associated with panic disorder, agoraphobia, depression, and social anxiety disorder (Carleton et al., 2012; McEvoy & Mahoney, 2011). We utilized the prospective anxiety factor because it is particularly well positioned to predict information seeking behavior, as this factor reflects discomfort with uncertainty and the desire for more certainty/information. In our undergraduate student pool over the five semesters that this study was conducted, participants' scores for PA (M = 18.67, SD = 6.29) were similar to published norms (e.g., Carleton, Collimore, & Asmundson's [2010] community sample mean = 19.45, SD=6.58, and student sample mean = 16.68, SD = 6.00; McEnvoy & Mahoney's [2011] clinical sample mean = 21.81, SD = 6.92). Internal consistency of the overall IUS (α = .98) and of the prospective anxiety (PA) subscale (α = .96) for our sample was excellent.

6. Facial Expression Coding System. The Facial Expression Coding System (FACES; Kring & Sloan, 2007) was used to examine the frequency, duration, valence, and intensity of participants' facial expressions while viewing the emotion-inducing film clips. In FACES, an "expression" is defined as a facial change from neutral (i.e., no expression) to non-neutral that then returns to neutral. When an expression occurs, a *frequency* count of expressions begins. In the current study, we also counted a new expression if the expression changed directly from positive to negative or vice versa. The *duration* of each expression is measured in seconds from the time of expression change from neutral to the time of expression change returning to neutral. Coders also rated the *valence* (positive or negative) and *intensity* (1 = low, 2 = medium, 3 = high, 4 = very high) of each expression detected. Rater agreement for FACES has been shown to be high (average *ICC* = .88; Kring & Sloan, 2007).

Two coders were trained by the principal investigator to code participants' facial expressions. Both coders coded all participants in the study; thus, we utilized a two-way random intraclass correlation to analyze inter-rater reliability. Inter-rater reliability was good or excellent for (a) frequency of positive expressions (sad film *ICC* [2, 2] = .90, 95% CI [.84, .94]; fearful film *ICC* [2, 2] = .98, 95% CI [.96, .99]); (b) frequency of negative expressions (sad film *ICC* [2, 2] = .91, 95% CI [.85, .94]; fearful film *ICC* [2, 2] = .95, 95% CI [.93, .97]); (c) duration of positive expressions for the fearful film (*ICC* [2, 2] = .98, 95% CI [.97, .99]); (d) duration of negative expressions (sad film *ICC* [2, 2] = .88, 95% CI [.81, .92]; fearful film *ICC* [2, 2] = .99, 95% CI [.98, .99]); (e) mean intensity of positive expressions (sad film *ICC* [2, 2] = .94, 95% CI [.91, .96]; fearful film *ICC* [2, 2] = .98, 95% CI [.97, .99]); and (f) mean intensity of negative expressions (sad film *ICC* [2, 2] = .93, 95% CI [.89, .95]; fearful film *ICC* [2, 2] = .94, 95% CI [.91, .96]). The only variable found to have a lower rate of agreement was the duration of

positive expressions for the sad film clip (*ICC* [2, 2] = .59, 95% CI [.36, .73]). During consensus meetings, the two coders came to consensus regarding all ratings; these consensus ratings were used for analyses.

7. Visual Attention. Coders were asked to calculate participants' attention toward versus away from the film clips. Coders examined participants' eyes and used a stop watch to calculate the precise number of seconds that participants were looking at the film clips. A higher number of seconds reflected higher visual attention to the emotional stimuli, whereas a lower number of seconds reflected visual avoidance of the stimuli. Inter-rater reliability for both the sad and fearful film clips was excellent ($\alpha = .99$)

D. Procedure

The proposed study underwent the approval process of the Institutional Review Board at the University of Illinois at Chicago. Upon arrival, participants were seated at a desk with a computer monitor, keyboard, and a box of tissues. They were asked to report a baseline SUDS rating, a state worry rating, and to complete the IUS (to ensure continued eligibility for the study), the PSWQ, the PANAS, and the BDI. Upon re-administration of the IUS, 85 participants were excluded because their scores on the PA factor no longer met inclusion criteria. Figure 1 presents an outline of study procedures.

1. Informing Participants About Stimuli. All participants were informed that they would be watching "emotionally upsetting film clips" as part of the study. Participants were reminded that they could stop watching the film clips at any point. After participants were informed about the film clips, they completed another SUDS rating.

2. Generating Questions About Film Clips. Participants were told that they would have an opportunity before watching the film to write down questions to which they would like

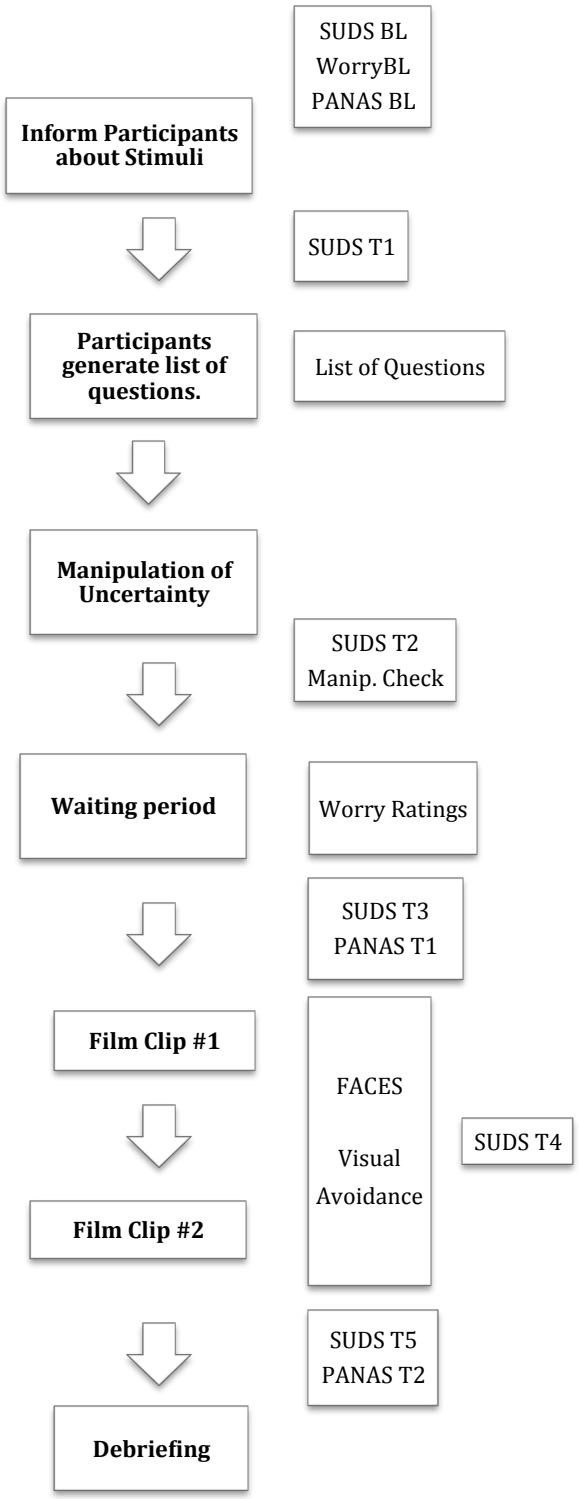

Figure 1. Diagram outlining study procedure flow with dependent variables to the right.

answers about the upcoming film clips. They were then given an unlimited amount of time to generate those questions. We calculated the number of questions generated and the amount of time taken to complete the task as measures of information seeking. Additionally, participants were asked "How much more at ease would you feel if you could have these questions answered?" (1 = "not at all," 5 = "a lot"), as well as "How much more at ease would you feel if you could be provided a summary about what happens in the films?" (1 = "not at all," 5 = "a lot").

3. Manipulation of Situational Uncertainty. Participants were randomly assigned to have certainty or uncertainty regarding the upcoming film clips. Participants in the *certainty* condition were provided with a detailed summary of the two film clips and then had each of their questions answered by the experimenter. Participants in the *uncertainty* condition were not provided with a summary of the film clips and did not have their questions answered. In order to control for the amount of time spent giving information to participants in the certainty condition, participants in the uncertainty condition were yolked to those in the certainty condition. Each participants in the uncertainty condition was yolked to a previous participant in the certainty condition (based on the order in which participants came into the study) and asked to wait in the laboratory room for the amount of time the participant in the certainty condition took to receive the information. Following this, participants completed another SUDS rating. They were then asked, "How uncertain are you about what the film clips will be like?" (1 = "extremely certain," 5 = "extremely uncertain"), which served as a manipulation check.

4. Anticipation Period. All participants stayed in the experimentation room for five minutes, during which they were asked to think about what it would be like for them to watch the upcoming film clips. They were interrupted every forty seconds and asked "What are you

thinking right now? Please write down the exact content of your thoughts." These thought samples were saved for later coding. They were also asked how worried they were at that moment on a scale from 0-100 ("0" = "not worried at all" to 100 = "extremely worried"). At the end of this anticipation period, participants completed another SUDS rating and another PANAS questionnaire.

5. Film Viewing. Participants then viewed the two film clips, both of which have been shown in previous studies to elicit the intended emotions (Gross & Levenson, 1995; Llera & Newman, 2010). The fearful clip was taken from the film *Silence of the Lambs* and depicts a female FBI agent stalking a serial killer through his house; the sad clip was taken from the film *The Champ* and depicts a son grieving over his dying father. The clips were presented in counterbalanced order, and each clip was 2-3 minutes in length. Participants completed a SUDS rating immediately after watching each film clip, and completed the PANAS after having watched both film clips. Finally, each participant was fully debriefed and provided with information concerning various mental health service resources

III. RESULTS

A. Preliminary Analyses

1. Assumptions of Normality. Dependent variables in all planned models were investigated for normality and were transformed accordingly to ensure that data did not violate assumptions of normality. Transformed variables included: the baseline measure of negative affect; visual attention during both film clips; and the frequency, duration, and intensity of both negative and positive facial expressions during both film clips. Of note, positive facial reactions to both the sad and fearful film clips were so rare that even when transformed, these variables remained positively skewed. These positive facial reaction variables were omitted from further analyses; thus, only negative facial reactions to both film clips were analyzed. Untransformed means and standard deviations are provided in all analyses for ease of interpretation.

2. Data Reduction. We examined the correlations between various dependent variables in order to assess the appropriateness of combining variables and/or conducting multivariate ANOVAs in order to reduce the risk of Type 1 error and increase ease of interpretation. We found moderate correlations (r = .22-.62) between (a) the number of questions asked about the upcoming film clips, (b) the time taken to generate questions, (c) ratings of how much more at ease participants would feel if they could receive the answers to their questions, and (d) ratings of how much more at ease participants would feel if they could receive a summary of the film clips; thus, we conducted a MANOVA on these three dependent variables instead of conducting individual ANOVAs.

We also examined the correlations between the frequency, duration, and intensity of negative facial reactions to the sad film clip and found that these were very strongly correlated (r = .93-.97); thus, these variables were standardized and combined into one variable representing

negative facial reactivity to the sad film clip. Similarly, we found that the frequency, duration, and intensity of negative facial reactions to the fearful film clip were very strongly correlated (r = .93-.96); thus, these variables were also standardized and combined into one variable representing negative facial reactivity to the fearful film clip. These new negative facial reactivity scores for the sad and the fearful film clips were moderately correlated with each other (r = .47); thus, we conducted a MANOVA to investigate these two dependent variables. Likewise, visual attention to the sad and the fearful film clip were moderately correlated (r = .33); thus, we conducted a MANOVA to investigate these two dependent variables.

We also examined the correlation of SUDS ratings, negative affect, and positive affect both before and after the film clips, respectively. SUDS and negative affect ratings were strongly correlated both before and after the film clips (r = .73); thus, we standardized and combined these ratings to form one variable representing self-reported negative reactivity before the film clips and one variable representing self-reported negative reactivity after the film clips. Positive affect was weakly correlated with both SUDS and negative affect ratings at both time points (r = -.22-.03); thus, we conducted two separate ANOVAs to examine self-reported positive and negative reactivity.

3. <u>Baseline Differences</u>. We examined whether individuals high in trait PA differed from those low in trait PA on baseline dependent measures (see TABLE II). Results indicated that relative to participants with low trait PA, those with high trait PA reported higher levels of baseline SUDs [$F(1, 85) = 10.64$, $p = .002$, $d = 0.70$], state worry [$F(1, 88) = 13.37$, $p = .000$, $d = 0.77$], positive affect [$F(1, 88) = 4.23$, $p = .04$, $d = 0.44$], negative affect [$F(1, 88) = 16.98$, $p = .000$, $d = 0.87$], trait worry [$F(1, 88) = 75.78$, $p = .000$, $d = 1.14$], and depression [$F(1, 88) = 30.80$, $p = .000$, $d = 1.18$].

TABLE II. DESCRIPTIVE STATISTICS FOR BASELINE MEASURES

	Low Trait PA		High Trait PA	
Variables (range)	Situational Certainty (*n* = 23) *M* (*SD*)	Situational Uncertainty (*n* = 18) *M* (*SD*)	Situational Certainty (*n* = 25) *M* (*SD*)	Situational Uncertainty (*n* = 24) *M* (*SD*)
SUDS (0-100)	11.74 (11.24)	12.22 (13.09)	20.43 (18.46)	27.39 (22.41)
Worry (0-100)	10.00 (12.06)	3.89 (7.78)	16.40 (20.18)	25.42 (22.26)
Negative Affect (10-50)	12.74 (3.15)	10.94 (1.39)	14.84 (5.97)	16.00 (5.28)
Positive Affect (10-50)	24.61 (6.21)	24.44 (8.64)	28.32 (9.38)	27.63 (7.46)
PSWQ (16-80)	39.87 (11.73)	43.28 (11.93)	62.25 (11.21)	62.25 (11.18)
BDI (0-63)	5.61 (5.35)	5.39 (6.29)	17.68 (13.94)	17.67 (12.27)

Note. High and low trait PA participants differed on all variables ($p < .05$). No baseline measure differences were found between the situational certainty and situational uncertainty conditions.

We also sought to ensure that the two randomly assigned conditions produced equivalent levels of baseline dependent measures. Results indicated that participants in the situational uncertainty and situational certainty conditions did not differ from each other in levels of baseline SUDS [$F(1, 85) = 1.45$, $p = .23$, $d = 0.26$], state worry [$F(1, 88) = 0.53$, $p = .47$, $d = 0.15$], positive affect [$F(1, 88) = 0.03$, $p = .87$, $d = 0.04$], negative affect [$F(1, 88) = 0.00$, $p = .99$, $d = 0.00$], trait worry [$F(1, 88) = 0.56$, $p = .46$, $d = 0.16$], or depression [$F(1, 88) = 0.04$, $p = .84$, $d = 0.04$].

4. Manipulation Check. Participants in the uncertainty condition endorsed a lower level of certainty about what the upcoming film clips would be like ($M = 2.71$, $SD = 1.13$) than did participants in the certainty condition ($M = 5.73$, $SD = 1.07$), $F(1, 88) = 168.95$, $p = .000$, $d =$

2.75. This indicated that our manipulation was successful in producing discrepant levels of situational uncertainty across the two randomly assigned conditions.

B. Effects of Trait PA on Distress and Information Seeking

We aimed to examine the effects of trait PA on individuals' subjective distress and information seeking behavior upon being informed that they would be exposed to an emotionally upsetting event. First, we conducted a 2 (PA: low, high) X 2 (Time: baseline, after being informed) mixed model ANOVA on reported SUDS ratings. Results indicated a main effect of PA, $F(1, 85) = 18.36$, $p = .000$, such that those high in PA reported greater distress ($M = 24.69$, $SD = 18.58$) than did those low in PA ($M = 11.40$, $SD = 10.84$) ($d = 0.87$). This was qualified by a marginally significant PA X Time interaction, $F(1, 85) = 3.85$, $p = .053$, $\eta^2_p = 0.04$, such that participants high in trait PA experienced an increase in distress from baseline to after having informed of the upcoming film clips [$F(1, 45) = 4.72$, $p = .04$; $d = 0.46$, whereas participants low in trait PA did not [$F(1, 40) = 0.42$, $p = .52$; $d = 0.15$)] (see Figure 2).

For information seeking behavior and beliefs, we ran a one-way (PA: low, high) between-subjects MANOVA on (a) the number of questions asked about the upcoming film clips, (b) the time taken to generate questions, (c) ratings of how much more at ease participants would feel if they could receive the answers to their questions, and (d) ratings of how much more at ease participants would feel if they could receive a summary of the film clips. Results indicated a multivariate main effect of trait PA on information seeking, $F(4, 80) = 6.19$, $p = .000$, $\eta^2_p = .24$. The follow-up univariate tests revealed that individuals high in trait PA ($M = 3.15$, $SD = 2.44$) tended to ask more questions than did those low in trait PA ($M = 2.18$, $SD = 2.13$), $F(1, 83) = 3.77$, $p = .056$, $d = 0.42$. Additionally, individuals high in trait PA believed that they would be more at ease if they could receive the answers to their questions ($M = 2.74$, $SD =$

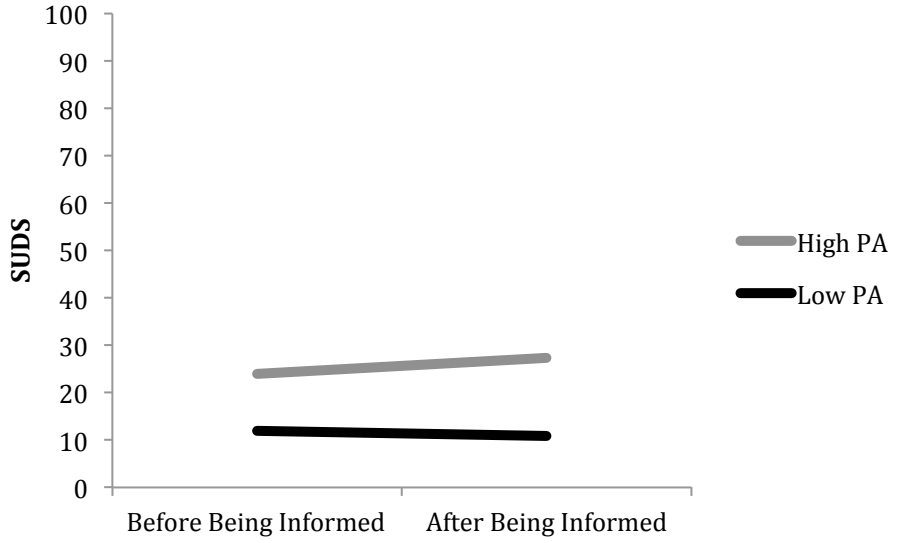

Figure 2. Distress for high PA and low PA participants before and after being informed about the upcoming film clips.

1.27) than did those low in trait PA (M = 1.82, SD = 0.85), $F(1, 83) = 14.69$, $p = .000$, $d = 0.84$. Furthermore, individuals high in trait PA reported that they would be more at ease if they could receive a summary of the films (M = 3.59, SD = 1.09) than did those low in trait PA (M = 2.50, SD = 1.30), $F(1, 83) = 17.82$, $p = .000$, $d = 0.92$. However, individuals with high and low trait PA did not differ in how long they took to generate their questions, $F(1, 83) = 0.00$, $p = .99$, $d = 0.00$.

C. Effects of Trait PA and Situational Uncertainty During Anticipation of a Distressing Event

We also examined the effects of both trait PA and situational uncertainty on individuals' experiences of subjective distress and state worry while anticipating the onset of a distressing event. For subjective distress, we ran a 2 (PA: low, high) X 2 (Condition: certainty, uncertainty)

X 2 (Time: beginning of anticipation period, end of anticipation period) mixed model ANCOVA on subjective distress ratings, controlling for baseline SUDS. Results indicated a main effect of PA such that participants high in trait PA were more distressed while anticipating the upcoming stressor (M = 27.86, SD = 18.90) than were participants low in trait PA (M = 12.70, SD = 10.60), $F(1, 82) = 9.17$, $p = .003$, $d = 0.98$. No other significant effects emerged. In particular, the hypothesized PA X Condition X Time interaction was not significant, $F(1, 82) = 2.43$, $p = .12$, $\eta^2_p = 0.03$.

For state worry, we ran a 2 (PA: high low) X 2 (Condition: certainty, uncertainty) X 5 (Time: thought sample 1, 2, 3, 4, 5) mixed model ANCOVA on state worry ratings, controlling for baseline state worry. Results indicated a main effect of PA, such that participants high in trait PA reported greater state worry across the anticipation period (M = 25.98, SD = 20.50) than did those low in trait PA (M = 7.38, SD = 11.18), $F(1, 79) = 19.61$, $p = .000$, $d = 1.09$. No other significant effects emerged. In particular, the hypothesized PA X Condition X Time interaction was not significant, $F(2.73, 215.50) = 0.38$, $p = .75$, $\eta^2_p = 0.005$.

D. <u>Effects of Trait PA and Situational Uncertainty During a Distressing Event</u>

1. <u>Self-reported Reactivity</u>. We examined the effects of both trait PA and state uncertainty on individuals' self-reported negative and positive reactivity during a distressing event. For negative reactivity, we ran a 2 (PA: low, high) X 2 (Condition: certainty, uncertainty) X 2 (Time: before film clips, after film clips) mixed model ANCOVA on our self-reported negative reactivity variable (constructed by combining SUDS and negative affect ratings), controlling for baseline self-reported negative reactivity. Results indicated a main effect of trait PA on negative reactivity, such that those high in trait PA (M = 0.73, SD = 1.89) reported higher negative reactivity than did those low in trait PA (M = -0.88, SD = 1.01), $F(1, 81) = 20.80$, $p =$

.000, $d = 1.04$. No other significant effects emerged. In particular, the hypothesized PA X Condition X Time interaction was not significant, $F(1, 81) = 0.57$, $p = .45$, $\eta^2_p = 0.007$.

For self-reported positive reactivity to the film clips, we also ran a 2 (PA: low, high) X 2 (Condition: certainty, uncertainty) X 2 (Time: before film clips, after film clips) mixed model ANCOVA on self-reported positive affect, controlling for baseline positive affect. Results indicated a significant PA X Time interaction, $F(1, 84) = 4.36$, $p = .04$, $\eta^2_p = 0.05$. Participants high in trait PA reported a significant decrease in positive affect from before to after seeing the film clips [$F(1, 47) = 32.30$, $p = .000$; $d = 0.46$], whereas participants low in trait PA did not evidence any change in positive affect [$F(1, 40) = 2.53$, $p = .12$; $d = 0.16$] (see Figure 3).

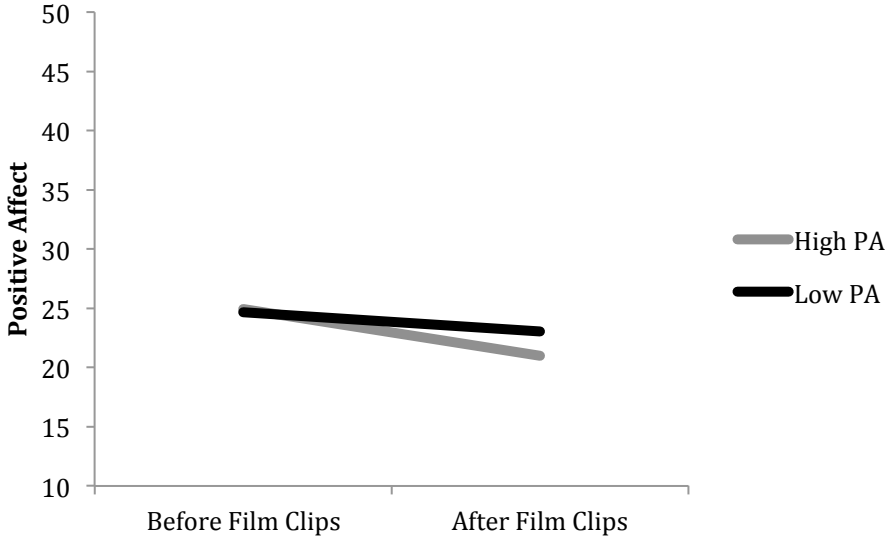

Figure 3. Positive affect for high PA and low PA participants before and after watching the film clips. Adjusted means are presented based on covarying baseline positive affect.

Results also indicated a significant Condition X Time interaction, $F(1, 84) = 4.74$, $p = .03$, $\eta^2_p = 0.05$. Participants in the uncertainty condition evidenced a significant decrease in positive affect from before to after seeing the film clips [$F(1, 41) = 27.98$, $p = .000$; $d = 0.51$]; participants in the certainty condition evidenced a significant, but smaller, decrease in positive affect from before to after seeing the film clips [$F(1, 46) = 12.08$, $p = .001$; $d = 0.19$] (see Figure 4). Again, the hypothesized PA X Condition X Time interaction was not significant, $F(1, 84) = 0.48$, $p = .49$, $\eta^2_p = 0.006$.

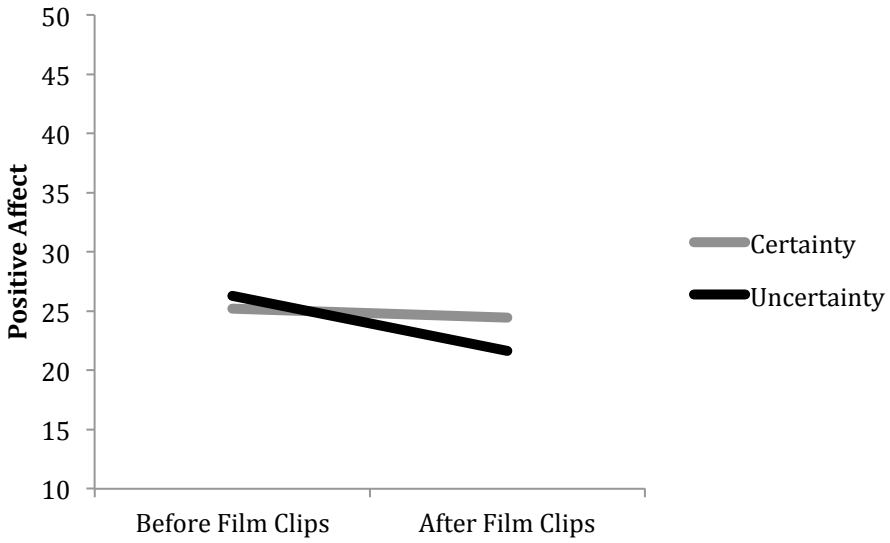

Figure 4. Positive affect for situational certainty and situational uncertainty before and after watching the film clips. Adjusted means are presented based on covarying baseline positive affect.

2. <u>Facial Reactivity</u>. For FACES coded negative facial reactivity, we ran a 2 (PA: high, low) X 2 (Condition: certainty, uncertainty) between-subjects MANOVA on reactivity to the sad

and fearful film clips. Results indicated a marginally significant multivariate main effect of Condition on negative facial reactivity, $F(2, 72) = 2.64$, $p = .08$, $\eta^2_p = .07$. The follow-up univariate tests were marginally significant or significant for both variables. For the sad film clip, there was a univariate main effect of Condition [$F(1, 73) = 4.41$, $p = .04$], such that participants in the uncertainty condition ($M = 0.59$, $SD = 2.66$) evidenced more negative facial reactivity than did participants in the certainty condition ($M = -0.44$, $SD = 2.20$) ($d = 0.43$). For the fearful film clip, results indicated a marginally significant univariate main effect of Condition [$F(1, 73) = 3.25$, $p = .08$], such that participants in the uncertainty condition ($M = 0.49$, $SD = 2.30$) evidenced more negative facial reactivity than did those in the certainty condition ($M = -0.43$, $SD = 2.25$) ($d = 0.41$). Results indicated no multivariate main effect of PA [$F(2, 72) = 0.42$, $p = .66$, $\eta^2_p = .01$] or multivariate PA X Condition interaction [$F(2, 72) = 0.10$, $p = .91$, $\eta^2_p = .003$].

3. <u>Visual Attention</u>. Finally, we conducted a 2 (PA: high, low) X 2 (Condition: certainty, uncertainty) between-subjects MANOVA on the amount of time visually attending to the sad and fearful film clips. Results indicated a significant multivariate main effect of Condition on visual attention, $F(2, 70) = 3.57$, $p = .03$, $\eta^2_p = .09$. For the sad film clip, univariate results indicated a main effect of Condition [$F(1, 71) = 6.98$, $p = .01$], such that participants in the uncertainty condition ($M = 155.77$ seconds, $SD = 4.54$ seconds) attended to the screen for less time than did those in the certainty condition ($M = 157.13$ seconds, $SD = 4.44$ seconds) ($d = 0.30$). However, for the fearful film clip, there was not a significant univariate main effect of Condition, $F(1, 71) = 1.65$ $p = .20$, $d = 0.02$. Results indicated no multivariate main effect of PA [$F(2, 70) = 0.10$, $p = .91$, $\eta^2_p = .003$] or multivariate PA X Condition interaction [$F(2, 70) = 0.12$, $p = .89$, $\eta^2_p = .003$]**.**

IV. DISCUSSION

In the present study, we aimed to examine how individuals with high and low trait PA differ in their emotional, cognitive, and behavioral reactions to situational certainty and uncertainty about an upcoming negative event. The intolerance of uncertainty model of worry (Dugas, Buhr, & Ladouceur, 2004; Dugas, Gagnon, Ladouceur, & Freeston, 1998) which posits that anxious individuals find uncertainty threatening, coupled with Woody and Rachman's (1994) theory that anxious individuals are motivated to seek safety signals, led us to expect that participants high in trait PA would seek more information about an upcoming stressor than would those low in trait PA. Indeed, our results indicated that when participants were initially informed about the upcoming stressor (watching emotionally upsetting film clips), those high in trait PA asked more questions about that upcoming event than did individuals low in PA (although this finding was marginally significant with a small effect size). This finding aligns with previous research showing that intolerance of uncertainty predicts information seeking behavior when outcomes are uncertain (Rosen & Knäuper, 2009). We also found that individuals high in trait PA reported that they would feel more at ease if they could receive answers to their questions and if they could receive a summary of what the upcoming films would contain (with large magnitude of effects). Thus, individuals high in trait PA may seek to reduce uncertainty through information seeking, and this information seeking may be motivated by beliefs about the utility of this information in reducing anxiety and distress. Given that trait PA is uniquely associated with GAD, those with GAD may likewise be motivated to seek information in an uncertain situation (McEvoy & Mahoney, 2011).

Woody and Rachman (1994) argue that attempts to find safety only lead to temporary decreases in distress for anxious individuals, as their tendency to attend to threatening stimuli in

their environment persists beyond the initial comfort that safety signals provide. However, our results did not support this temporary relief hypothesis: when uncertainty was reduced by providing answers to questions about and summaries of the upcoming films, individuals high in trait PA did *not* evidence a reduction in anxiety, and they did *not* react to this reduced uncertainty differently from those low in trait PA. Rather, those high in trait PA simply maintained higher levels of state worry and distress while anticipating what it would be like to watch the upcoming film clips. Past research has indicated that relative to non-worriers, worriers report higher levels of distress when anticipating stressful events (Hoyer, Becker, & Roth, 2001); our results add to this finding by suggesting that uncertainty alone may not contribute to these levels of heightened distress during anticipation of a stressful event. Taken together, our results demonstrate that individuals high in trait PA *expect* a decrease in distress as a consequence of being provided with information about an upcoming stressor, but when they are provided with this information, they do *not* experience this anticipated decrease in distress. This false expectancy of the utility of gathering information about an upcoming stressor may function similarly to a host of other false expectancies held by anxious individuals.

Compared to healthy control participants, anxious individuals may be less accurate in predicting their emotional experiences. The emerging field of affective forecasting has shown that individuals broadly have difficulty accurately anticipating emotional reactions (Dunn & Laham, 2006; Hoerger, 2007; Wilson & Gilbert, 2003). Furthermore, individuals high in neuroticism show even more difficulty accurately predicting their emotional reactions given their negative biases. For example, Hoerger and Quirk (2010) found that neurotic individuals anticipate more severe negative emotional reactions to future events as compared to their actual experienced reactions of that event. Thus, individuals high in trait worry (which is highly

correlated with neuroticism; McEvoy & Mahoney, 2013), as well as individuals high in trait PA, may be especially poor predictors of their emotional experiences. These findings align with previous research showing that individuals with GAD (a condition uniquely associated with high levels of trait PA) may have difficulty predicting their emotional reactions to a future negative event. For instance, individuals with GAD tend to overestimate the likelihood and severity of negative events and to underestimate their ability to cope with those events (Borkovec, Hazlett-Stevens, & Diaz, 1999; Ladouceur, Blais, Freeston, & Dugas, 1998; MacLeod, Byrne, & Valentine, 1996). Conversely, individuals with GAD also hold *positive* biases about the emotional utility of worry, in that they are more likely to report that worry can help them cope with negative emotions (Borkovec & Roemer, 1995; Penney, Mazmanian, & Rudanycz, 2013) – a false positive expectancy given evidence that worrisome states are associated with distress and impairment (Gentes & Ruscio, 2014; Kessler & Wittchen, 2002) and lower levels of belief in the ability to cope (Hirsch, Perman, Hayes, Eagleson & Mathews, 2015).

In spite of this pattern of results indicating that anxious individuals are poor predictors of their emotional experiences, the mechanisms by which participants high in trait PA do not feel less distraught or worried when uncertainty is alleviated remain unclear. However, several findings from extant research might illuminate these mechanisms. We initially considered that the *uncertainty* surrounding an upcoming stressor might not be the active ingredient that causes distress for individuals with high trait PA. In the three experimental investigations examining IU and/or situational uncertainty, two studies (Ladouceur et al., 2000; Rosen & Knäuper, 2009) found that high intolerance of uncertainty led to an increase in state worry when outcomes were uncertain, whereas another investigation (Oglesby & Schmidt, in press) found that high intolerance of uncertainty did not lead to higher anticipatory anxiety when outcomes were

uncertain. However, in all three of these investigations, the manipulation of situational uncertainty and/or intolerance of uncertainty was confounded with varying likelihood of anticipated threat. We sought to rule out this potential confound by manipulating situational uncertainty while holding constant the likelihood of the negative event occurring. Our results suggest that if uncertainty about the nature of a negative event is alleviated, but the *likelihood* of that event remains, distress is not alleviated. Individuals high in trait PA may be especially resistant to the effects of what we expected would be safety signals (information about the film clips) because of their tendency to be more distressed by thinking about upcoming negative events (Hoyer, Becker, & Roth, 2001), coupled with their tendency to attend to threat (Butler & Mathews, 1983; 1987; Dugas et al., 2005). This *negativity* bias, rather than an *uncertainty* bias, may be a much more central construct for individuals who suffer from high prospective anxiety, such as chronic worriers. This possibility is further supported by our finding that when participants were informed that they would be viewing upsetting film clips (with no further details provided regarding content), participants high in trait PA experienced an increase in distress while participants low in trait PA did not (although the magnitude of this effect was small).

Another potential reason why alleviating uncertainty about the film clips did not lead to a reduction in distress is that although we alleviated participants' uncertainty about the *nature* of the stimulus, we did not alleviate their uncertainty about the *effects* of that stimulus. Several lines of research indicate that worriers perceive negative emotions to be especially aversive (Mennin, Heimberg, Turk, & Fresco, 2005; Salters-Pedneault, Roemer, Tull, Rucker, & Mennin, 2006; Turk, Heimberg, Luterek, Mennin, & Fresco, 2005), and worriers underestimate their ability to cope with stressors (Ladouceur, Blais, Freeston, & Dugas, 1998). Thus, participants' uncertainty

about their impending emotional reactions may have led to a maintenance of distress even though they were given information about the nature of the upcoming stressor.

Given previous findings that a period of worry inhibits emotional responding to a subsequent negative emotional stimulus (Behar, Zuellig, & Borkovec, 2005; McLaughlin, Borkovec, & Sibrava, 2007; Llera & Newman, 2010), we expected that participants high in trait PA in the uncertainty condition would evidence the smallest increase in negative emotions from before to after viewing the film clips. Although participants high in trait PA did report higher state worry during the anticipation period, they did *not* evidence a different reaction to the film clips compared to those low in trait PA. Instead, those high in trait PA maintained a higher level of negative emotion *both before and after the film clips* relative to those low in PA. It is important to note that our participants high in trait PA worried more in the anticipation period due to trait differences, whereas Llera and Newman (2010) experimentally manipulated worrisome states. Therefore, we cannot definitively conclude whether our finding that participants high in trait PA maintained more negative emotion both before and after the film clip is due to prior state worry or due to trait-level differences in PA. Although neither participants high nor low in trait PA evidenced an increase in *negative* reactivity from before to after the film clips, participants high in trait PA did evidence a decrease in *positive* affect from before to after the film clips. Again, we cannot be sure whether these results can be attributed to prior state worry or to differences in trait PA, given that those high in trait PA also experienced increased worry prior to viewing the film clips. Future investigations should examine the effect of prior state worry manipulations on both negative affect *and* positive affect in reaction to a subsequent stressor.

Our results also indicated participants in the uncertainty condition evidenced a larger decrease in positive affect from before to after viewing the film clips than did participants in the certainty condition. Additionally, participants in the uncertainty condition expressed greater negative facial reactivity while viewing both film clips. Both of these findings are supported by Bar-Anan, Wilson, and Gilbert's (2009) findings that uncertainty intensifies both positive and negative affective reactions to viewing emotional film clips. Finally, in the sad film clip (but not the fearful film clip), participants in the uncertainty condition attended to the screen for less time than did those in the certainty condition. Therefore, uncertainty may lead to avoidance of specific types of emotional experiences (i.e., sadness). More research is necessary in order to better understand the differential effect uncertainty may have on sadness, fear, and other emotional states.

This study had several limitations. First, we did not have sufficient power to detect some of the interactions that we sought to investigate. With a larger sample size, we may be able to explore these interactions more fully, and data collection is thus ongoing. Second, we are limited in generalizing our results to individuals with GAD because we did not select participants based on diagnostic status. Instead, we selected for a construct (PA) that is highly correlated with GAD and that is highlighted in the intolerance of uncertainty model of GAD. We chose to select for individuals high and low in trait PA in order to isolate this particular trait that is theorized to predict behavior and emotional reactions that serve as a sustaining mechanism chronic worriers. Third, we are limited in generalizing the results of the current study to other contexts because our manipulation of situational uncertainty is different from how individuals experience uncertainty in their daily lives. For instance, in our manipulation of uncertainty, we *markedly* decreased uncertainty for some participants, informing them of what would transpire during each moment

of the upcoming stressor. This marked manipulation of uncertainty may have increased the likelihood of detecting whether individuals high in trait PA would respond differently to decreased uncertainty. On the other hand, in spite of this liberal test, we failed to find that individuals high in trait PA responded differently to situational certainty and uncertainty, potentially providing even stronger evidence that when individuals high in trait PA are alleviated of their uncertainty, they do not experience concomitant alleviation of distress. Finally, our results might not generalize to other contexts due to the nature of the stressor we chose to utilize. Viewing upsetting film clips may not have been personally meaningful for participants high in trait PA, given that at least some populations with high prospective anxiety (e.g., individuals with GAD) have been shown to worry most often about interpersonal situations (Hoyer, Becker, & Roth, 2001). Although individuals high in trait PA reported higher distress than did individuals low in trait PA while anticipating viewing the film clips, they reported fairly low overall levels of distress (a mean of 27.86 out of 100). Including more personally relevant, higher distress-inducing stressors may lead to different reactions to situational uncertainty. For example, if uncertainty regarding an upcoming *social* stressor were alleviated, distress about that upcoming stressor may likewise be alleviated. Future research should focus on experimental paradigms in which situational uncertainty is manipulated within the context of personally relevant stressors that are likely to elicit intense emotional experiences.

In conclusion, we sought to examine whether individuals high in PA would react differently from those low in PA to a certain versus uncertain stressor, and improved upon past research by holding constant the threat of a negative event occurring and by measuring the degree to which trait PA predicted information seeking behavior. We found that although individuals high in trait PA reported a higher belief that being provided with detailed information

about the upcoming stressor would make them feel more at ease, they did not experience a decrease in distress when they were provided with more information. Rather, relative to individuals low in trait PA, those high in trait PA evidenced heightened self-reported negative emotionality throughout the entire experiment – a trend that began at baseline, intensified when participants were initially informed about the emotionally upsetting film clips, and then persisted until after participants viewed the film clips. This work has contributed to our understanding of the disconnect that may exist between what individuals high in trait PA *believe* about the distress-reducing utility of information about uncertain events and the *actual* distress-reducing utility of information about uncertain events. Furthermore, our results indicating that individuals high in PA experience more negative emotionality both in anticipating and in experiencing a negative event—regardless of how uncertain they are about the exact details of the event—demonstrates that heightened distress regarding negative events may be a more central construct than intolerance of uncertainty in GAD.

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