



Intolerance of uncertainty moderates the relation between negative life events and anxiety

Charlene Y. Chen^{a,*}, Ryan Y. Hong^b

^a Department of Counseling and Clinical Psychology, Teachers College, Columbia University, 525 West 120th St., New York, NY 10027, United States

^b Department of Psychology, National University of Singapore, 9 Arts Link, Singapore 117570, Singapore

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ABSTRACT

The role of Intolerance of Uncertainty (IU) as a moderating factor of anxiety has been largely unexplored in the literature. The link between stress and uncertainty suggests theoretically that IU could augment the negative impact of stressors on anxiety levels. Consistent with a diathesis–stress model, the present article examined the interactive effect of IU and daily hassles on anxiety symptoms in a non-clinical sample of 110 undergraduates. Findings indicated that IU moderated the relation between daily hassles and residual change in anxiety symptoms over a one-month period, such that daily hassles increased these symptoms among individuals with high IU but not those with low IU. In particular, beliefs that uncertainty impaired behavior and reflected poorly on the individual's character were found to contribute to this significant interaction effect. Contrary to expectation, IU did not moderate the relation between daily hassles and worry. Possible reasons for the observed discrepancy and its implications are discussed in light of these findings.

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1. Introduction

Although stress and anxiety are closely associated, stressful events do not inevitably lead to clinical anxiety. Diathesis–stress theories posit that the link between life events and psychiatric symptoms is frequently moderated by individual differences (Dohrenwend & Dohrenwend, 1981). Personality variables like locus of control, for example, seem to predispose individuals toward or buffer them against adverse mental health consequences (Johnson & Sarason, 1978; Kohn, Lafreniere, & Gurevich, 1991). In light of the established literature suggesting that uncertainty engenders stress and anxiety (Pervin, 1963), we propose that how one typically responds to uncertain situations, or Intolerance of Uncertainty (IU), constitutes a personality characteristic that could moderate the negative impact of stressful occurrences on anxiety.

IU has garnered considerable research attention since its conceptualization (Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994). It is a dispositional trait reflecting unfavorable attitudes towards uncertainty and what it entails (Dugas & Robichaud, 2007). Individuals with high IU tend to find uncertain events unacceptable, irrespective of their likelihood of occurrence (Ladouceur, Talbot, & Dugas, 1997). They believe that uncertainty impairs their behavior and reflects poorly on them, and that unpredictability is

unfair and troubling (Sexton & Dugas, 2009). IU has been documented in previous research as being associated with higher Neuroticism, as well as lower Extraversion and Openness (Hong & Paunonen, 2007; Van der Heiden et al., 2010), and is seen as a social–cognitive vulnerability for anxiety (Koerner & Dugas, 2008). To date, the literature on IU has focused largely on its connection with worry and Generalized Anxiety Disorder (GAD), an anxiety disorder with worry as its core feature (Tolin, Abramowitz, Brigidi, & Foa, 2003). Although a few studies have extended the construct beyond this context to other anxiety symptoms (e.g., obsessive–compulsive behaviors; Tolin et al., 2003), its role in the interplay between life events and anxiety symptoms remains largely unknown.

The current study addresses this gap by investigating how IU interacts with stressful events, specifically daily hassles, to influence change in anxiety symptoms over a one-month period. Daily hassles refer to mundane irritants and distressing demands such as being stuck in a traffic jam or meeting an imminent deadline (Kohn et al., 1991). In this study, we focus on daily hassles because they have been found to be associated with the tendency to perceive threat and monitor threat-relevant information (Russell & Davey, 1993). We predict that the interaction between IU and daily hassles would affect residual change in anxiety. Specifically, we hypothesize that individuals with higher IU would experience increased anxiety levels when they encounter daily hassles than those with lower IU.

* Corresponding author.

E-mail address: cyc2117@columbia.edu (C.Y. Chen).

Several reasons underlie our argument for an interaction effect on anxiety. First, IU might heighten anxiety by increasing perceived threat. In stressful situations, uncertain elements of a problem become more salient to intolerant individuals, thus threat is perceived even when uncertainty is minimal (Dugas et al., 2005; Koerner & Dugas, 2008). Second, individuals with high IU tend to have weaker problem orientation (i.e., poor problem-solving confidence, low control beliefs, and unfavorable emotional responses) that impedes their problem-solving ability (Dugas, Freeston, & Ladouceur, 1997). Both processes could exacerbate existing symptoms in response to everyday stressors.

To our knowledge, only one study had investigated the moderating effect of IU on the association between life events and anxiety symptoms (Ciarrochi, Said, & Deane, 2005). However, the cross-sectional design and failure to account for baseline symptoms in that study rendered the interpretation of its results problematic. Furthermore, worry was not assessed in spite of its close link to IU that has been well established in the literature (e.g., Dugas, Gagnon, Ladouceur, & Freeston, 1998). Despite these weaknesses, Ciarrochi et al. maintained that IU magnified the negative impact of daily hassles on mental health (i.e. stress, anxiety, and depression). To clarify the moderating role of IU on worry and anxiety, we collected data at two separate time points, which allowed us to control for baseline symptoms in our prediction of subsequent symptoms. Additionally, we employed a scale that is more prevalently utilized to assess IU (Intolerance of Uncertainty Scale; Buhr & Dugas, 2002) than the “response to lack of structure” scale used by Ciarrochi and colleagues.

The present study aims to expand current understanding of IU in the interplay of stressful antecedents and anxiety. Consistent with a diathesis-stress model (e.g., Monroe & Simons, 1991), we hypothesized that IU would moderate the relation between daily hassles and residual change in anxiety/worry over a one-month period. Because uncertainty abounds in everyday life stressors, individuals with high IU would perceive many sources of threat and therefore experience elevated symptom levels. In contrast, individuals who are able to tolerate and thus manage uncertainty are likely to respond more effectively to these stressful events (Anderson & Schwartz, 1992). Given recent evidence that two factors might underlie the IU construct (see Sexton & Dugas, 2009), the current study also explored the implications of this two-factor model in our analyses.

2. Method

2.1. Participants and procedure

Data presented here were collected as part of a larger unpublished study in personality and psychopathology (Hong & Paunonen, 2007; Study 1), but analyses here are new and have not been previously reported. Participants comprised 132 undergraduates taking an introductory course to psychology at a Canadian university. They participated in exchange for course credits. The sample size decreased to 130 after two participants were removed due to incompleteness in their data. The final sample of 31 male and 99 female undergraduates composed of 74.6% Caucasians, 13.8% Asians, and 11.6% others. Their mean age was 19.30 years ($SD = 3.79$, range = 17–44).

Administration of measures occurred in groups of 10–20 participants in a classroom setting. Participants filled out a series of measures that assessed IU, anxiety and worry symptoms in a first session (T1), and returned a month later for a second session to complete the same measures used at T1 (except IU) and an additional instrument assessing daily hassles experienced in the past month. Owing to the return of only 110 participants (84.6%) for

the follow-up session at T2, all analyses in the current study were based on this final sample.

2.2. Measures

2.2.1. Intolerance of uncertainty

The IUS (Buhr & Dugas, 2002) consists of 27 items measuring the extent to which the respondent considers uncertainty as unacceptable, results in stress and frustration, and reflects badly on oneself. Items are rated on a 5-point Likert scale ranging from 1 (*Not at all characteristic of me*) to 5 (*entirely characteristic of me*). Examples of items include “Uncertainty makes life tolerable”, and “The smallest doubt can stop me from acting”. The IUS has excellent internal consistency ($\alpha = .94$), test–retest reliability over a five-week period ($r = .74$), as well as convergent and divergent validity when tested with measures of worry, depression and anxiety (Buhr & Dugas, 2002). The coefficient alpha was .93 in this study. Recently, Sexton and Dugas (2009) had argued for the existence of two kinds of beliefs underlying the IUS; the names of the subscales and their corresponding coefficient alphas are as follows: *Uncertainty Has Negative Behavioral and Self-Referent Implications* (Factor 1; $\alpha = .89$), and *Uncertainty Is Unfair and Spoils Everything* (Factor 2; $\alpha = .87$).

Anxiety. The Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988) was used to assess anxiety experienced by our participants over the past two weeks. The 21-item self-report inventory measures the degree to which respondents experience symptoms of anxiety (particularly somatic ones). Each item corresponds to common symptoms and is rated on a Likert scale ranging from 0 (*not at all*) to 3 (*a lot*). Examples of items include “feeling hot” and “shaky”. Though originally developed for psychiatric populations, reliability and validity for the BAI has been established with non-clinical populations (Creamer, Foran, & Bell, 1995). In this study, the coefficient alphas for the BAI at T1 and T2 were both .89, and test–retest reliability was .64.

Worry. Worry was measured using the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990). The 16-item instrument is designed to capture the generality, excessiveness, and uncontrollability of pathological worry. However, participants in this study were specifically instructed to base their responses on their experiences in the last two weeks. Respondents rate each item on a 5-point Likert scale ranging from 1 (*not at all typical of me*) to 5 (*very typical of me*). Examples of items include “My worries overwhelm me”, and “Once I start worrying, I just can’t stop”. The PSWQ has demonstrated reliability and validity among non-clinical groups (Davey, 1993). In this study, the coefficient alphas for the PSWQ at both T1 and T2 were .94, and test–retest reliability was .76.

Daily hassles. The Inventory of College Students’ Recent Life Experiences (ICSRLE; Kohn, Lafreniere, & Gurevich, 1990) was used to identify individual exposure to sources of hassles within a one-month period. The 55-item inventory, developed specifically for use among college students, was administered at T2. Examples of items include “Conflicts with professor(s),” and “Lower grades than you hoped for.” Each event endorsed is rated on a 4-point Likert scale: 0 (*Not at all part of my life*), 1 (*Only slightly part of my life*), 2 (*Distinctly part of my life*), and 3 (*Very much part of my life*). Scores were further dichotomized to reduce any possible confounding by participants’ subjective interpretation of their symptoms. Ratings of “0” and “1” were recorded as 0 to represent event non-occurrence, whereas ratings of “2” and “3” were recorded as 1 to signify event occurrence. Computation of ratings as a frequency count would constitute a more objective measure of stressor occurrence, which is similar to other stressful life events scales (e.g., Needles & Abramson, 1990).

3. Results

3.1. Preliminary analyses

Preliminary analyses were conducted to examine whether the cases of attrition from T1 to T2 ($n = 20$) were different from the participants who completed both sessions ($n = 110$). Participants who completed both assessments scored higher in T1 anxiety, $t(128) = 2.15, p < .05$, and T1 worry, $t(128) = 2.27, p < .05$. We reasoned that interpretational problems that might arise from attrition were minimal because those with elevated symptoms at T1 returned at T2. If the pattern had been reversed (i.e., those who dropped out had higher symptom levels), then inferences made from the current data might be more problematic due to a loss of highly symptomatic individuals. As both groups did not differ significantly on IU scores, and were identical in terms of their demographics, we reasoned that the two groups of individuals were at least similar in these stable personal characteristics.

Descriptive statistics for the study variables, along with their intercorrelations, are presented in Table 1. Correlational analyses indicated that higher IU was associated with more anxiety and worry symptoms at T1 and T2, as well as greater frequency of daily hassle occurrences. In addition, the frequency of daily hassles was also positively related to anxiety and worry at both times.

3.2. Predicting anxiety symptoms

To examine whether IU augmented the negative impact of daily hassles on anxiety, a three-step hierarchical regression analysis was conducted (see Table 2; top panel). Assumptions of normality, linearity, homoscedasticity, and independence of errors were met in the current data. As advocated by Aiken and West (1991), the predictor variables were centered prior to the regression analyses. BAI-T1 was entered as a covariate in the first step to control for baseline anxiety symptoms at T1, followed by the two main predictor variables in the second step, and finally the product term between these two variables in the third step. Of particular interest was the third step, in which the interaction between IU and daily hassles was significant ($\Delta R^2 = .02, \beta = .16, p < .05$).

In probing the nature of the interaction (Aiken & West, 1991; O'Connor, 1998), we found that the interaction effect supported our hypothesis (see Fig. 1). Specifically, daily hassles did not result in any residual change in anxiety for people with low IU (simple slope = .08, $SE = .14, ns$). Conversely, for individuals with high IU, daily hassles greatly increased symptom levels at T2, even after controlling for baseline symptoms at T1 (simple slope = .41, $SE = .16, p < .05$). As daily hassles became more frequent, those with high IU displayed a lot more symptoms, consistent with a diathesis-stress model.

Table 1

Means, standard deviations, and correlations among study variables.

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. IUS	57.95	18.18							
2. IU Factor 1	29.49	10.50	.93**						
3. IU Factor 2	28.46	9.18	.91**	.71**					
4. BAI-T1	14.68	9.95	.41**	.41**	.35**				
5. BAI-T2	12.54	9.30	.34**	.34**	.28**	.64**			
6. PSWQ-T1	50.73	15.69	.57**	.50**	.55**	.58**	.46**		
7. PSWQ-T2	49.91	14.70	.45**	.36**	.48**	.41**	.52**	.76**	
8. ICSRLE	14.17	6.73	.21*	.19*	.20*	.34**	.37**	.30**	.41**

Note. IUS = Intolerance of Uncertainty Scale; IU Factor 1 = "Uncertainty Has Negative Behavioral and Self-Referent Implications"; IU Factor 2 = "Uncertainty Is Unfair and Spoils Everything"; BAI = Beck Anxiety Inventory; PSWQ = Penn State Worry Questionnaire; ICSRLE = Inventory of College Students' Recent Life Experiences.

* $p < .05$.
** $p < .01$.

Table 2

Hierarchical regression analyses predicting T2 anxiety and worry symptoms.

	Predictors	ΔR^2	<i>b</i>	<i>SE b</i>	β	Partial <i>r</i>
<i>Predicting BAI-T2</i>						
Step 1	Constant	.41**	3.79	1.23		
	BAI-T1		.60	.07	.64**	.64
Step 2	Constant	.03	4.99	1.33		
	BAI-T1		.51	.08	.55**	.54
	IUS		.04	.04	.08	.09
	ICSRLE		.23	.11	.17*	.20
Step 3	Constant	.02*	5.15	1.31		
	BAI-T1		.48	.08	.52**	.52
	IUS		.05	.04	.10	.12
	ICSRLE		.22	.11	.16*	.20
	IUS \times ICSRLE		.01	.01	.16*	.21
<i>Predicting PSWQ-T2</i>						
Step 1	Constant	.58**	13.77	3.12		
	PSWQ-T1		.71	.06	.76**	.76
Step 2	Constant	.03*	16.88	3.72		
	PSWQ-T1		.65	.07	.69**	.67
	IUS		.01	.06	.01	.02
	ICSRLE		.42	.14	.19**	.28
Step 3	Constant	.00	16.80	3.75		
	PSWQ-T1		.65	.07	.70**	.67
	IUS		.01	.06	.01	.01
	ICSRLE		.42	.14	.19**	.28
	IUS \times ICSRLE		.00	.01	-.02	-.04

Note. BAI = Beck Anxiety Inventory; IUS = Intolerance of Uncertainty Scale; ICSRLE = Inventory of College Students' Recent Life Experiences; PSWQ = Penn State Worry Questionnaire.

* $p < .05$.
** $p < .01$.

3.3. Predicting worry

To ascertain whether the same interaction effect occurred for worry symptoms, a three-step hierarchical regression analysis similar to the one outlined above was performed (see Table 2; bottom panel). There were no violations of assumptions associated with normality, linearity, homoscedasticity, and independence of errors. A significant main effect for the covariate was obtained in the first step. There was also a significant increase in variance for the second step, with a significant main effect derived for daily hassles. The third step however did not account for any significant increase in variance. Contrary to our expectations, the interaction between IU and daily hassles on residual change in worry was nonsignificant.

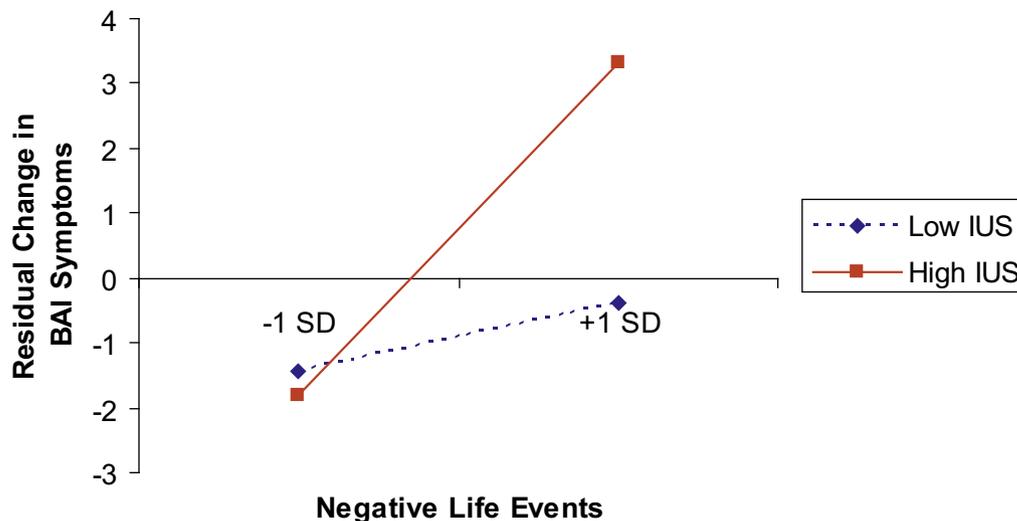


Fig. 1. Interaction effect between intolerance of uncertainty (IUS) and negative life events on residual change in BAI over a one-month period.

3.4. Supplementary analyses

Given that two factors underlie the IUS (Sexton & Dugas, 2009), the preceding analyses were re-conducted using these factors to examine their effects more closely. (See Table 1 for the intercorrelations between the factors and other variables.) In particular, we wanted to identify which of the two factors are responsible for the significant interaction effect associated with the total IUS scale in the prediction of residual BAI change. Hierarchical regression analyses showed a significant interaction effect between Factor 1 and daily hassles ($\Delta R^2 = .03$, $\beta = .37$, $p < .05$). The interaction between Factor 2 and daily hassles was nonsignificant. Simple slope analyses revealed that the pattern of interaction for Factor 1 was similar to that found for the entire IUS (Fig. 1). Among individuals who had a higher tendency to believe that being uncertain impaired performance and reflected badly on them, daily hassles led to an increment in anxiety (simple slope = .48, $SE = .16$, $p < .01$). On the other hand, daily hassles did not result in any residual change in anxiety for those with a lower tendency to possess such beliefs (simple slope = .01, $SE = .14$, *ns*). All interaction effects between IUS subscales and daily hassles in predicting worry symptoms were nonsignificant.

4. Discussion

The current study investigated the moderating role of IU within a diathesis-stress model. As hypothesized, the interaction between IU and daily hassles predicted residual change in anxiety over and above the variance accounted for by baseline symptoms. Relative to individuals with lower IU, those with higher IU experienced greater anxiety upon exposure to daily hassles. In addition, individuals who tend to believe that uncertainty impairs behavior and reflects poorly on their character had more anxiety symptoms when they were subjected to daily hassles. Contrary to our expectation, IU did not interact with daily hassles to predict changes in worry.

Two possibilities underlie the significant interaction between IU and daily hassles on general anxiety. The first pertains to the increased threat perceived by individuals with high IU. There is recent evidence demonstrating that such individuals are inclined to overestimate the probability of negative outcomes and their subsequent costs (Bredemeier & Berenbaum, 2008). Such appraisals, coupled with the information processing bias toward uncertain as-

pects of encountered difficulties (Dugas et al., 2005), are likely to inflate perceived threat and therefore raise anxiety levels. Secondly, IU might hinder individuals from exercising problem-solving skills effectively because of lowered confidence in their own solutions (Dugas et al., 1997; see also Davey, 1994; Hong, 2007). As stated earlier, these individuals tend to have ineffective problem orientation manifested in low problem-solving confidence and diminished perceived control over the problem-solving process, which could subsequently elevate anxiety symptoms. The significant moderation of Factor 1 of IUS on anxiety strengthens this line of reasoning. Believing that uncertainty causes behavioral impairment (e.g., “When it’s time to act, uncertainty paralyzes me”) erodes confidence in the ability to cope with threat, which in turn intensifies anxiety in threatening situations (Sexton & Dugas, 2009).

To account for the nonsignificant interaction effect of IU and daily hassles on worry, we speculate that occurrences of daily hassles are not requisite for worry to emerge. Dugas et al. (1998) posited that IU could trigger ‘what if...?’ questions in the absence of an immediate stimulus. Specifically, individuals with high IU tend to focus on future events regardless of the probability of their occurrence, and cannot help but worry because “they could occur”. Given that worry is an attempt to control the uncertainty inherent to anticipatory life events that might or might not come to fruition (Dugas, Buhr, & Ladouceur, 2004), the propensity to worry prevails whether or not individuals with high IU experience daily hassles (the strong stability coefficient of the PSWQ attests to this observation).

Understanding factors that strengthen the relation between daily hassles and anxiety is paramount. Daily hassles have proximal significance for health outcomes, and many originate in one’s personality, routine environment, or their interaction (Kanner, Coyne, Schaefer, & Lazarus, 1981). Hence, a reciprocal relationship is conceivable such that IU predisposes one to experience or perceive more hassles, which in turn trigger feelings of uncertainty and distress. This process could ultimately escalate anxiety as suggested by the significant interaction effect. Therefore, clinicians should help patients with high IU focus on key issues in problems, away from uncertainty-related thoughts and behavioral consequences, and encourage them to proceed with problem-solving despite being unsure of its outcome beforehand (Dugas et al., 1997).

The nonsignificant interaction effect on worry also has important implications for IU research and clinical practice. In conjunc-

tion with the high correlation between the IUS and PSWQ, this finding seems to imply that individuals with high IU are more likely to worry whether stressors are present or not. Worries about future events that are not amenable to problem solving (e.g., possibility of an airplane crash) might be especially problematic. Given the function of worry as a type of cognitive avoidance to inhibit emotional processing (see Borkovec, Ray, & Stöber, 1998), such worries should be targeted with exposure therapy to aversive stimuli.

Several limitations should be noted in this study. First, our main findings were based on a final pool of participants who reported more symptoms of anxiety and worry in the first session than those who failed to complete the second session, giving rise to the possibility of selection bias toward highly symptomatic individuals and hence inflation of observed effects. Nevertheless, as reasoned earlier, the reverse pattern would have generated more difficulties in the interpretation of results. Second, worry was assessed using the PSWQ, which measures general propensity to worry as opposed to the degree of worrying in a specified time period. Participants, however, were instructed to complete the PSWQ based on their experiences over the past two weeks. Third, the sole reliance on self-reports as a measure of daily hassles made it difficult to differentiate between actual life stressors experienced and subjective amplification of these stressors. Finally, generalizability of the current findings might be compromised by the overrepresentation of females in the sample and use of undergraduates as participants.

In this study, we have adopted the traditional stance that high IU could lead to greater psychological distress. However, future research could explore whether an elevation of anxiety symptoms would also result in the development of IU. Though the bidirectionality between IU and anxiety has not been investigated here, we draw on the evolutionary function of anxiety as facilitating the organism's detection of danger and prompt response to threat (Oatley & Johnson-Laird, 1987). This suggests that anxiety symptoms might encourage heightened vigilance for threatening aspects in one's environment, including the uncertain elements of it. The pairing of uncertain events with aversive symptoms of anxiety might thereafter promote elevated IU.

In summary, the present findings contribute to the literature in three ways: (a) it provides support for a cognitive diathesis-stress model of anxiety among a non-clinical sample; (b) it widens and enhances current understanding of IU above and beyond worry and GAD; and (c) it allows for the prediction of change in anxiety (as opposed to simple correlation with baseline levels) by measuring symptoms at two time points. Consequently, people with high IU seem generally inclined toward worry; their tendency to experience anxiety, however, increases only when stressors occur in their lives.

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