Can the Components of a Cognitive Model Predict the Severity of Generalized Anxiety Disorder?

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Abstract

Over the past decade, a number of well-controlled studies have supported the validity of a cognitive model of generalized anxiety disorder (GAD) that has four main components: intolerance of uncertainty, positive beliefs about worry, negative problem orientation, and cognitive avoidance. Although these studies have shown that the model components are associated with high levels of worry in nonclinical samples and with a diagnosis of GAD in clinical samples, they have not addressed the question of whether the model components can predict the severity of GAD. Accordingly, the present study sought to determine if the model components are related to diagnostic severity, worry severity, and somatic symptom severity in a sample of 84 patients with a primary diagnosis of GAD. All model components were related to GAD severity, although positive beliefs about worry and cognitive avoidance were only modestly associated with the severity of the disorder. Intolerance of uncertainty and negative problem orientation had more robust relationships with the severity of GAD (and with worry severity, in particular). When participants were divided into Mild, Moderate, and Severe GAD groups, intolerance of uncertainty and negative problem orientation distinguished the Moderate and Severe GAD groups from the Mild GAD group, even

when age, gender, and depressive symptoms were statistically controlled. Overall, the results lend further support to the validity of the model and suggest that intolerance of uncertainty and negative problem orientation are related to the severity of GAD, independently of sociodemographic and associated clinical factors. The theoretical and clinical implications of the findings are discussed.

Several models of generalized anxiety disorder (GAD) have been proposed in recent years. Some emphasize the role of cognitive avoidance (i.e., Borkovec et al., 2004), whereas others focus on the function of metacognitive beliefs (i.e., Wells & Carter, 2001) or highlight the role of emotion dysregulation (i.e., Mennin et al., 2002). Alternatively, our clinical research group has developed a cognitive model that is based primarily on the idea that individuals with GAD have difficulty tolerating and dealing with the uncertainty of everyday life. The model has four main components, each of which can be conceptualized as a cognitive process involved in GAD: intolerance of uncertainty, positive beliefs about worry, negative problem orientation, and cognitive avoidance.

Intolerance of uncertainty, the model's main feature, refers to a dispositional characteristic resulting from a set of negative beliefs about uncertainty and its implications (Dugas & Robichaud, 2007). Individuals who are intolerant of uncertainty believe that uncertainty is stressful and upsetting, that being uncertain about the future is unfair, that unexpected events are negative and should be avoided, and that uncertainty interferes with one's ability to function (Buhr & Dugas, 2002). Research suggests that the relationship between intolerance of uncertainty and worry/GAD is relatively specific. In nonclinical samples, although one study found that intolerance of uncertainty was equally related to worry and obsessive-compulsive symptoms (Holaway et al., 2006), most of the data accumulated so far suggest that intolerance of uncertainty is more closely related to worry than to other anxiety and mood disorder symptoms (Dugas et al., 2001b; Dugas et al., 2004b; Roberts et al., 2006). Clinical data show that patients with GAD are more intolerant of uncertainty than patients with panic disorder with agoraphobia (Dugas et al., 2005) and patients with other anxiety disorders (Ladouceur et al., 1999). Finally, research suggests that intolerance of uncertainty may be a causal risk factor for worry/GAD. In nonclinical samples, the experimental manipulation of intolerance of uncertainty leads to changes in worry, with decreased intolerance of uncertainty leading to less worry, and increased intolerance of uncertainty leading to more worry (Ladouceur et al., 2000). In clinical samples, changes in intolerance of uncertainty typically precede changes in worry over the course of cognitive-behavioral therapy (CBT) for GAD (Dugas et al., 1998b).

The second component of the model, positive beliefs about worry, is based on the idea that individuals with GAD have unrealistic beliefs about the usefulness of worrying and that these beliefs are positively and negatively reinforced by false contingencies (Dugas & Robichaud, 2007; Wells, 1999). Individuals with GAD may overestimate the usefulness of worrying in any number of areas. For example, they may believe that worrying helps with problem solving, provides motivation to get things done, allows one to avoid unpleasant emotions should unfortunate events occur, or directly alters the course of events. Furthermore, individuals with GAD often equate worrying with caring and thus believe that being a worrier is a sign that they are kindhearted and compassionate. Nonclinical data show

that positive beliefs about worry are closely related to level of worry, and this holds true whether beliefs are measured by structured interview (Francis & Dugas, 2004) or self-report (Holowka et al., 2000). Patients with GAD endorse more positive beliefs about worry than do healthy controls (Dugas et al., 1998a; Ladouceur et al., 1999), and change in beliefs over the course of CBT predicts outcome for patients with GAD (Laberge et al., 2000).

The third model component, negative problem orientation, has also received considerable empirical support. Negative problem orientation can be defined as a disruptive cognitive set toward problems that includes perceiving problems as threats to well-being, doubting one's problem-solving ability, and being pessimistic about problem-solving outcomes (D'Zurilla & Nezu, 1999). Negative problem orientation is highly correlated with worry, and their relationship is not the result of shared variance with anxiety or depression (Dugas et al., 1997). Patients with GAD report a more negative problem orientation than do patients with other anxiety disorders (Ladouceur et al., 1999) and healthy controls (Dugas et al., 1998a). Finally, in a laboratory study, changes in problem-solving confidence, a component of problem orientation, led to changes in catastrophic worrying (Davey et al., 1996a).

The model's fourth component, cognitive avoidance, is based on the notion that individuals with GAD use a variety of strategies (both automatic and controlled) to avoid concrete thoughts (including mental images) of threatening outcomes and unpleasant emotional responding (see Borkovec et al., 2004, for a detailed description of the avoidance theory of GAD). Given that avoidance can interfere with the emotional processing of fear (Foa & Kozak, 1986), the strategies used by individuals with GAD ultimately lead to the maintenance of high levels of worry and anxiety (Borkovec & Newman, 1999). Cognitive avoidance strategies that may be particularly relevant to GAD include substituting threatening thoughts with neutral or positive ones, transforming mental images into verbal-linguistic thoughts, using various distraction tactics, avoiding stimuli that may trigger worrisome thoughts, and attempting to suppress worrisome thoughts (Dugas & Koerner, 2005). Cognitive avoidance is related to both trait worry and catastrophic worry (Sexton & Dugas, 2004; Sexton et al., 2004). Patients with GAD report more cognitive avoidance than do healthy controls (Dugas et al., 1998a), and decreases in cognitive avoidance are related to positive outcomes following CBT (Dugas et al., 2004a).

In summary, most of the data supporting the model of GAD described above come from: (a) nonclinical studies comparing individuals with different levels of worry; (b) clinical studies comparing patients with GAD to patients with other anxiety disorders and healthy controls; and (c) treatment studies showing that decreases in the model components predict decreases in GAD symptoms over the course of CBT. Although these findings are very informative, they do not address whether the model components can predict the severity of GAD. This is an important question because, given the limited range (i.e., elevated levels) of worry and anxiety *within* a sample of patients with GAD, examining the relationship between the model components and the severity of GAD symptoms constitutes a conservative test of the model's sensitivity.

Accordingly, the main goal of this study was to determine if the cognitive processes making up the model are related to different indicators of severity (diagnostic severity, worry

severity, and somatic symptom severity) in patients with a primary diagnosis of GAD. The study's hypotheses were the following. First, we expected that all model components would be related to the severity of GAD. Second, because the model was devised primarily to account for GAD worry (Dugas & Ladouceur, 1998), we predicted that the components would be more closely related to worry severity than to somatic symptom severity. Finally, given previous research showing that intolerance of uncertainty is the cognitive process that best predicts the presence of GAD (Dugas et al., 1998a; Dugas et al., 2005), we anticipated that it would also be the best predictor of the severity of GAD.

Method

PARTICIPANTS

Participants were 84 treatment-seeking adults with a primary diagnosis of GAD. There were 58 women and 26 men, all of whom were Francophone Caucasians. The mean age for the sample was 37.76 years ($SD = 12.43$), and the mean years of education was 15.36 ($SD = 3.24$). In terms of occupational status, 59.5% of participants were employed, 26.2% were unemployed, and 14.3% were full-time students. The mean duration of GAD was 13.43 years ($SD = 16.14$), whereas the mean severity of GAD was 5.64 ($SD = 1.06$) on the 9-point (0 to 8) Clinician's Severity Rating scale of the Anxiety Disorders Interview Schedule for *DSM-IV* (ADIS-IV; Di Nardo et al., 1994). Comorbid conditions were diagnosed in 59.5% of the sample, with 42.9% having one comorbid condition, 10.7% having two comorbid conditions, 3.6% having three comorbid conditions, and 2.4% having four comorbid conditions. The specific conditions were panic disorder with agoraphobia ($n = 16$), specific phobia ($n = 14$), panic disorder without agoraphobia ($n = 13$), social anxiety disorder ($n = 10$), dysthymic disorder ($n = 8$), major depressive disorder ($n = 5$), obsessive-compulsive disorder ($n = 3$), and hypochondriasis ($n = 2$). More than half of the sample (58.3%) was taking anxiolytic or antidepressant medication. Finally, 39.3% of the sample had previously received CBT for an anxiety or mood disorder.

PROCEDURE

Media advertisements were *not* used to recruit participants for this study; all participants were recruited through the regular patient flow of the Anxiety Disorders Clinic of Sacré-Cœur Hospital in Montreal, Canada. All patients referred to our clinic with a probable diagnosis of GAD (by the Evaluation and Liaison Unit of Sacré-Cœur Hospital) were assessed by a team psychiatrist (Pierre Savard, Adrienne Gaudet, or Julie Turcotte) using the Mini International Neuropsychiatric Interview, Version 4.4 (MINI; Sheehan et al., 1994). Patients who met criteria for primary GAD on the MINI were given a consent form explaining the goals and procedures of the study and were referred for further diagnostic assessment by a doctoral student (Nina Laugesen, Melisa Robichaud, Kylie Francis, or Naomi Koerner) using the ADIS-IV. The doctoral students received training in the use of the ADIS-IV from the study's primary investigator (Michel J. Dugas), who had administered the interview in two previous clinical trials (i.e., Freeston et al., 1997; Ladouceur et al., 2000). Following the administration of the ADIS-IV, patients completed a battery of questionnaires before leaving the clinic (see Measures section below). Patients who received a primary diagnosis of GAD (i.e., the most severe/disabling of all disorders) on both structured

interviews and who also met the study's other inclusion criteria were invited to participate in a clinical trial as well as the current study. Inclusion criteria were: (1) a primary diagnosis of GAD with a score of at least 4 on the ADIS-IV Clinician's Severity Rating, (2) a difference of at least 2 points on the ADIS-IV Clinician's Severity Rating between GAD and any comorbid conditions, (3) 18 to 64 years of age, (4) no change in medication type or dose during 4 to 12 weeks before assessment (4 weeks for benzodiazepines, 12 weeks for other medications), (5) no evidence of suicidal intent, (6) no evidence of current substance abuse, and (7) no evidence of current or past schizophrenia, bipolar disorder, or organic mental disorder.

In all, 102 patients were assessed with the ADIS-IV and were asked to complete the study questionnaires. Of the 102 patients, 18 were excluded from the study for the following reasons: GAD was not diagnosed ($n = 5$) or was not the primary diagnosis ($n = 5$) on the ADIS-IV, the questionnaire battery was not completed because of participant dropout ($n = 4$), the severity of a comorbid disorder was not rated 2 points less than the rating for GAD on the ADIS-IV ($n = 2$), and a medical problem required immediate attention ($n = 2$). The intake data for the 84 patients who met inclusion criteria were retained for the study.

DIAGNOSTIC AND SYMPTOM MEASURES

The Mini International Neuropsychiatric Interview, Version 4.4 (MINI; Sheehan et al., 1994) is a brief structured Axis I interview designed for use in research and clinical settings. The MINI assesses mood disorders, anxiety disorders, substance use disorders, psychotic disorders, eating disorders, and suicidal risk. The interview also includes optional sections for the assessment of other related disorders. Previous research suggests that the MINI has adequate psychometric properties (Sheehan et al., 1997). Although the interview does not typically provide severity ratings for diagnosed conditions, we used the 9-point rating scale from the ADIS-IV (see below) to provide information about the severity of diagnoses on the MINI. By having independent raters provide severity ratings using two interviews, we were able to calculate interrater agreement on the severity of diagnosed conditions, rather than limiting agreement calculations to the presence/absence of diagnosed conditions.

The Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Di Nardo et al., 1994) assesses all anxiety disorders and screens for mood disorders, somatoform disorders, psychoactive substance use disorders, psychotic disorders, and medical problems. The interview yields information on the presence of Axis I disorders with severity ratings on a 9-point Likert scale (0 = *absent* to 8 = *very severe*). Data show that the diagnostic reliability of the anxiety disorders obtained with the ADIS-IV is good, with improvements over the ADIS-III-R (Brown et al., 2001).

The Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990) is comprised of 16 items designed to evaluate the tendency to worry excessively and uncontrollably. The PSWQ has high internal consistency, $\alpha = .86$ to $.95$, and good test-retest reliability over four weeks, $r = .74$ to $.93$. It also shows evidence of convergent and divergent validity as it is more highly correlated with other measures of worry than with measures of anxiety or depression (Molina & Borkovec, 1994).

The Worry and Anxiety Questionnaire (WAQ; Dugas et al., 2001a) is made up of 11 items covering *DSM-IV* diagnostic criteria for GAD. The WAQ has satisfactory test-retest reliability over 9 weeks, satisfactory diagnostic sensitivity (75%) and specificity (82%), and good known-groups validity (Dugas et al., 2001a). As a complement to the PSWQ, which assesses the tendency to worry, only the Somatic subscale of the questionnaire (WAQ-Som) was retained for this study. The WAQ-Som is comprised of six items measuring GAD somatic symptoms: restlessness or feeling keyed up or on edge, being easily fatigued, difficulty concentrating or mind going blank, irritability, muscle tension, and sleep disturbance. For each somatic item, participants are asked the following question: “Over the past six months, to what extent have you been disturbed by _____ when you were worried or anxious?” Each item is rated on a 5-point scale (1 = *not at all* and 5 = *very severely*).

MEASURES OF MODEL COMPONENTS

The Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994) consists of 27 items relating to the idea that uncertainty is unacceptable, reflects badly on a person, and leads to frustration, stress, and the inability to take action. The IUS shows excellent internal consistency, $\alpha = .91$ (Freeston et al., 1994) and good test-retest reliability over 5 weeks, $r = .78$ (Dugas et al., 1997). Furthermore, the IUS shows evidence of convergent and divergent validity (Dugas et al., 2001b).

The *Why Worry-II* (WW-II; Gosselin et al., 2003) is a 25-item revised version of the Why Worry questionnaire (WW; Freeston et al., 1994) designed to assess positive beliefs about worry. The WW-II has five subscales, each of which reflects a different set of positive beliefs about worry: (1) worry aids in problem solving, (2) worry helps to motivate, (3) worrying protects one from negative emotions in the event of a negative outcome, (4) the act of worrying itself prevents negative outcomes, and (5) worry is a positive personality trait. The WW-II has high internal consistency, $\alpha = .93$, and a factor structure that maps neatly onto its theoretically derived subscales. The questionnaire also has adequate test-retest reliability at 5 weeks, $r = .81$, and shows evidence of convergent, divergent, and criterion-related validity (Gosselin et al., 2003). Given the goals of the study and the large number of measures used, only the WW-II total score was retained for the analyses.

The Social Problem-Solving Inventory, Revised Short Form (SPSI; D’Zurilla et al., 1998) is a 25-item questionnaire that assesses self-perceived social problem-solving ability. The SPSI contains five subscales: Negative Problem Orientation, Positive Problem Orientation, Rational Problem Solving, Impulsivity/Carelessness Style, and Avoidance Style. The SPSI has adequate internal consistency ($\alpha = .79$ to $.83$), good 3-week test-retest reliability ($r = .74$), and has demonstrated predictive, convergent, and discriminant validity (D’Zurilla et al., 1998). Given that our model posits that negative problem orientation is the key problem-solving component involved in GAD, only the five items from the Negative Problem Orientation subscale (SPSI-NPO) were retained for the main analyses.

The Cognitive Avoidance Questionnaire (CAQ; Gosselin et al., 2002) contains 25 items assessing the tendency to use cognitive avoidance strategies. The CAQ has five theoretically derived subscales: (1) Thought Substitution, (2) Transformation of Images into Thoughts, (3) Distraction, (4) Avoidance of Threatening Stimuli, and (5) Thought Suppression. The

CAQ has excellent internal consistency, $\alpha = .92$ to $.95$, and very good 4-week test-retest reliability, $r = .81$. It also shows evidence of convergent validity and criterion-related validity (Gosselin et al., 2002). As was the case for the WW-II, only the CAQ total score was retained for the analyses.

ANCILLARY MEASURE

The Beck Depression Inventory II (BDI-II; Beck et al., 1996) is made up of 21 groups of four items reflecting different degrees of depressive symptoms. Respondents indicate which item within each group best describes them during the past 2 weeks. Examples of themes covered by the BDI-II include sadness, pessimism, loss of interest, and problems with sleep. The measure has very good internal consistency, $\alpha = .92$, and excellent 1-week test-retest reliability, $r = .93$ (Beck et al., 1996). The BDI-II also shows evidence of convergent and divergent validity (Steer & Clark, 1997).

Results

DATA SCREENING

With the exception of the WW-II, all measures were within acceptable skew tolerances (i.e., $\text{skew}/SE > |2.58|$). The WW-II, however, showed a moderate positive skew, $\text{skew}/SE = 4.82$. To correct for the skewed distribution, a $\log^{10}$ transformation was applied to the WW-II data. The resultant variable was within skew tolerances, $\text{skew}/SE = 2.32$. Therefore, the transformed WW-II scores were used for all analyses reported below, with the exception of the descriptive statistics presented in Tables 1 and 3.

DIAGNOSTIC RELIABILITY

To determine diagnostic reliability, we assessed interrater agreement for the primary diagnosis on the MINI and the ADIS-IV. Given that both interviews included 0-to-8 severity scales, we were also able to assess agreement on the severity of the primary disorder. Thus, criteria for interrater agreement were (a) concurrence on primary diagnosis and (b) agreement on severity of primary diagnosis (defined as a difference of no more than 1 point on the severity scale of each interview). Using these criteria for diagnostic agreement, we calculated kappa scores and obtained values of $\kappa = .68$ for all 102 patient interviews and $\kappa = .72$ for the interviews of the 84 patients making up the final sample.

PRELIMINARY ANALYSES

Means, standard deviations, and ranges for all study measures, which are quite typical for patients with primary GAD, are presented in Table 1. Initial analyses examined the relationship between different indicators of GAD severity and various sociodemographic and clinical variables. GAD severity was assessed in three ways: (a) with clinician's severity rating scores from the ADIS-IV (diagnostic severity), (b) with scores from the PSWQ (worry severity), and (c) with scores from the WAQ-Som (somatic symptom severity). We first examined the relationship between the indicators of GAD severity and the sociodemographic variables of age, gender, education, and occupation. Diagnostic severity (ADIS-IV) and worry severity (PSWQ) were unrelated to the sociodemographic variables. Somatic symptom severity (WAQ-Som), however, was related to both age and gender with

greater report of somatic symptoms in younger participants, $r = -.27$, $p < .05$, and in women, $F(1, 82) = 8.56$, $p < .01$, $\eta^2 = .10$. We then examined the relationship between the indicators of GAD severity and the clinical variables of duration of GAD, number of comorbid conditions, depressive symptoms (BDI-II), medication usage, and previous course of CBT. Again, diagnostic severity and worry severity were unrelated to all clinical variables. However, somatic symptom severity was positively correlated with depressive symptoms, $r = .37$, $p < .001$.

RELATIONSHIP BETWEEN GAD SEVERITY AND MODEL COMPONENTS

We then examined correlations between the three indicators of GAD severity and the four measures of the model components, namely, intolerance of uncertainty (IUS), positive beliefs about worry (WW-II), negative problem orientation (SPSI-NPO), and cognitive avoidance (CAQ). The correlation matrix, which is presented in Table 2, shows that as expected, the three indicators of GAD severity (ADIS-IV, PSWQ, and WAQ-Som) were correlated with each other.¹ More importantly, the matrix also shows that intolerance of uncertainty (IUS) and negative problem orientation (SPSI-NPO)² were correlated with all three indicators of GAD severity, that cognitive avoidance (CAQ) was correlated with two indicators (diagnostic and somatic symptom severity), and that positive beliefs about worry (WW-II) were only correlated with diagnostic severity.

Because the preliminary analyses revealed that age, gender, and depressive symptoms were correlated with somatic symptom severity, we recalculated the correlations while controlling for these three variables. Only two partial correlations continued to reach statistical significance. Namely, worry severity continued to be positively correlated both with intolerance of uncertainty, $r = .34$, $p < .01$, and negative problem orientation, $r = .26$, $p < .05$. Furthermore, tests of differences between nonindependent correlations (using Fisher r -to- z transformations) revealed that intolerance of uncertainty was more highly correlated with worry severity ($r = .34$, $p < .01$) than with somatic symptom severity ($r = .11$, $p > .05$), $z = 1.96$, $p < .05$.

MODEL COMPONENTS IN MILD, MODERATE, AND SEVERE GAD

We were also interested in determining if the model components could distinguish between groups of patients with varying degrees of GAD severity. Relatedly, we were also interested in knowing which particular groups could be differentiated by the model components. To address these questions, we first separated participants into three groups, based on their scores on the three measures of GAD severity: Mild GAD ($n = 20$), Moderate GAD ($n = 43$), and Severe GAD ($n = 21$). Participants in the Mild GAD group had scores below the total sample mean on all three measures of GAD severity (ADIS-IV, PSWQ, and WAQ-Som); those in the Moderate GAD group had scores above the total sample mean on one or two of the measures of GAD severity; and those in the Severe GAD group had scores above the total sample mean on all three measures of GAD severity. We then carried out four one-way univariate analyses of variance to examine group differences on each of the model

¹Because the examination of the relationship between the model components and the severity of GAD symptoms within a sample of GAD patients constitutes a conservative test of the model, we opted not to apply an alpha correction to Table 2.

²As expected, the four other subscales of the SPSI were uncorrelated with the three indicators of GAD severity.

components. The groups differed on intolerance of uncertainty (IUS), $F(2, 81) = 7.39, p < .001, \eta^2 = .15$, and negative problem orientation (SPSI-NPO), $F(2, 81) = 4.94, p < .01, \eta^2 = .11$. Post hoc tests showed that participants in the Moderate and Severe GAD groups scored significantly higher on both intolerance of uncertainty and negative problem orientation than those in the Mild GAD group. No differences were observed between the Moderate and Severe GAD groups. Means and standard deviations for the model component measures within each subgroup of patients are presented in Table 3.

Once more, the analyses were rerun while controlling for age, gender, and depression. The results of the univariate analyses of covariance revealed that the groups continued to differ on intolerance of uncertainty, $F(2, 78) = 4.96, p < .01, \eta^2 = .11$, and negative problem orientation, $F(2, 78) = 3.39, p < .05, \eta^2 = .08$. Furthermore, the pattern of specific between-group differences was unchanged, with participants in the Moderate and Severe GAD groups scoring higher on the measures of intolerance of uncertainty and negative problem orientation than participants in the Mild GAD group.

Discussion

This study sought to determine if the components of our cognitive model are related to the severity of GAD. The first hypothesis, that all model components would be related to GAD severity, was supported. Using zero-order correlations, all components of the model were related to diagnostic severity. It should be noted, however, that the importance of both positive beliefs about worry and cognitive avoidance received only modest support, as the zero-order correlations were the only analyses to show that these model components were related to the severity of GAD. It may be that positive beliefs about worry and cognitive avoidance showed modest relationships with the severity of GAD for different reasons. There is now evidence that positive beliefs about worry play a more important role in the early stages of the development of GAD than in the later stages (Holowka et al., 2000). This is consistent with the metacognitive theory of GAD (Wells, 2004, 2006), which posits that positive beliefs about worry contribute to the initial use of worry as a coping strategy but that negative beliefs about worry play a more important role in full-blown GAD. Anecdotally, our clinical experience suggests that patients with GAD present with varying degrees of positive beliefs about worry. For some, positive beliefs appear to play a key role in maintaining high levels of worry and anxiety, whereas others do not appear to hold these beliefs. Thus, it may be that positive beliefs about worry are only modestly associated with the severity of GAD because their role in full-blown GAD is quite variable (as opposed to their role in the early stages of the development of the disorder).

As for cognitive avoidance, its modest association with the severity of GAD may be the result of a measurement issue. As underscored by Borkovec's avoidance theory of GAD (Borkovec et al., 2004; Borkovec & Newman, 1999), some forms of cognitive avoidance in GAD are not necessarily accessible to awareness. In fact, the avoidance of concrete mental images in patients with GAD is thought to be mainly an automatic or implicit cognitive process. Although the avoidance theory of GAD has received much empirical support (e.g., Borkovec & Hu, 1990; Borkovec et al., 1993), implicit cognitive avoidance remains an elusive process in terms of assessment. Thus, although the CAQ has shown strong

psychometric properties in previous nonclinical studies (Gosselin et al., 2002), like any self-report measure, it is not ideally suited for the assessment of processes that may not be entirely accessible to awareness. However, given that some cognitive avoidance strategies assessed by the CAQ are clearly under volitional control (e.g., thought suppression, distraction), it is our position that, at the very least, it is an appropriate measure for some forms of cognitive avoidance in GAD.

The second hypothesis, that the model components would be more closely related to worry severity than to somatic symptom severity, was not supported in the uncontrolled analyses, but received some support when potential confounds were statistically controlled. In the zero-order correlations, worry severity was only related to two model components (intolerance of uncertainty and negative problem orientation), whereas somatic symptom severity was related to three components (intolerance of uncertainty, negative problem orientation, and cognitive avoidance). This is surprising given that the components of the model are thought to contribute directly to worry, which is then theorized to contribute to GAD somatic symptoms (Dugas & Ladouceur, 1998; Dugas & Robichaud, 2007). In the present study, however, the results of the uncontrolled analyses suggest that the model is quite sensitive to GAD somatic symptoms, as the severity of these symptoms was related to all components but positive beliefs about worry.

When age, gender, and depressive symptoms were controlled, however, a different picture emerged. Specifically, the only significant relationships that remained were those between worry severity and both intolerance of uncertainty and negative problem orientation. Furthermore, the correlation between intolerance of uncertainty and worry severity was significantly higher than the correlation between intolerance of uncertainty and somatic symptom severity. Thus, the results of the partial correlations suggest that the model components are more specifically related to worry severity than to somatic symptom severity. This, however, may not actually be the case. Of the six GAD somatic symptoms, three are also found in the diagnostic criteria for major depressive disorder (MDD), namely, concentration problems, insomnia, and fatigue. Furthermore, a fourth GAD somatic symptom, restlessness, resembles the MDD symptom of psychomotor agitation. Because we controlled for scores on the BDI-II, which is specifically designed to assess the *DSM-IV* symptoms of MDD, the partial correlations may well have constituted an overly conservative test of the relationship between the model components and the severity of GAD somatic symptoms. In effect, the partial correlations controlling for depressive symptoms eliminated the shared variance of at least half of the GAD somatic symptoms with the model components. Thus, the lack of specificity observed in the relationship between the model components and the severity of GAD somatic symptoms may well have resulted from the fact that at least half of these symptoms are common to both GAD and MDD.

The final hypothesis, which stated that intolerance of uncertainty would be the best predictor of the severity of GAD, received moderate support. In the zero-order correlations, intolerance of uncertainty was related to all three indicators of GAD severity. When participants were divided into groups based on scores on the indicators of GAD severity, intolerance of uncertainty distinguished participants in the Moderate and Severe GAD groups from those in the Mild GAD group. And finally, when age, gender, and depressive

symptoms were statistically controlled, intolerance of uncertainty continued to be related to the severity of worry and continued to distinguish the Moderate and Severe GAD groups from the Mild GAD group.

Overall, the results suggest that intolerance of uncertainty is a better predictor of the severity of GAD than either positive beliefs about worry or cognitive avoidance. However, given that intolerance of uncertainty and negative problem orientation produced a similar pattern of results, it could be argued that both of these model components are equally strong predictors of GAD severity. To further explore the relative contributions of intolerance of uncertainty and negative problem orientation to the severity of GAD, we conducted additional linear regressions in which the model components were entered simultaneously and the predicted variables were diagnostic severity, worry severity, and somatic symptom severity. In all three regressions, the model components significantly predicted the severity of GAD. However, in terms of individual contributions of the model components to the prediction of GAD severity, the only significant result was that intolerance of uncertainty made a unique contribution to worry scores, above and beyond the other model components.³ Thus, although negative problem orientation appears to be a strong predictor of the severity of GAD, when the contribution of intolerance of uncertainty is taken into account, negative problem orientation does not make a unique contribution to the prediction of GAD severity.

The present study had a number of limitations. First, because only participants receiving a diagnosis of GAD on the MINI were referred for the ADIS-IV, the assessors who administered the ADIS-IV were not completely blind to the results of the MINI (although they had no knowledge of the severity of GAD or the presence of comorbid conditions). Thus, the reported rates of agreement between the structured diagnostic assessments are undoubtedly overestimated. Second, the CAQ is a new measure that has yet to be validated in clinical samples of anxious patients. Although the CAQ has strong psychometric properties in nonclinical samples (Gosselin et al., 2002), this is the first study to use the questionnaire in a clinical sample. As discussed previously, a related limitation is that the Transformation of Images into Thoughts subscale of the questionnaire taps a process that is not fully conscious (this may also be true for other subscales, but to a lesser extent). As a result, self-report only offers a partial assessment of cognitive avoidance as it relates to GAD. Finally, the study would have benefited from the inclusion of a measure of negative beliefs about worry such as the Consequences of Worrying Scale (Davey et al., 1996b) or the Meta-Cognitions Questionnaire (Cartwright-Hatton & Wells, 1997), both of which contain negative belief subscales. Although negative beliefs about worry are implicitly included in our model within the cognitive avoidance component (negative beliefs lead to various attempts to avoid worrisome thoughts), it could certainly be argued that a more direct measure of these beliefs would have been useful.

To our knowledge, this is the first study to test a model of GAD *within* a sample of patients with primary GAD. As mentioned earlier, by probing the relationship between the model components and various indicators of GAD severity, this study constitutes a relatively

³We reran these analyses with only intolerance of uncertainty and negative problem orientation as the predictor variables and obtained identical results.

stringent test of the model's validity. The findings show that intolerance of uncertainty and negative problem orientation were robustly related to the severity of GAD. For the most part, the relationship between the severity of GAD and these two model components was independent of sociodemographic and clinical factors, including the severity of depressive symptoms.

Acknowledgments

We wish to thank Mary Hedayati and Nicole Gervais for their invaluable help with the smooth running of this study.

This study was supported by Grant MOP-42454 from the Canadian Institutes of Health Research awarded to Michel J. Dugas.

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Table 1Means, standard deviations, and range for all study measures ($N=84$)

	Mean	Standard deviation	Range
ADIS-IV	5.64	1.06	4–8
PSWQ	60.05	8.45	37–77
WAQ-Som	21.29	4.16	8–30
IUS	70.79	20.35	33–114
WW-II	45.89	18.82	25–110
SPSI-NPO	10.20	4.26	2–20
CAQ	51.78	14.42	25–89

Note. ADIS-IV=Anxiety Disorders Interview Schedule for DSM-IV (Clinician's Severity Rating); PSWQ=Penn State Worry Questionnaire; WAQ-Som=Somatic subscale of the Worry and Anxiety Questionnaire; IUS =Intolerance of Uncertainty Scale; WW-II=Why Worry-II; SPSI-NPO=Negative Problem Orientation sub-scale of the Social Problem Solving Inventory (Revised, Short Form); CAQ=Cognitive Avoidance Questionnaire.

Table 2

Correlations between the measures of GAD severity (ADIS-IV, PSWQ, and WAQ-Somatic) and the measures of the model components (IUS, WW-II, SPSI-NPO, and CAQ) (*N*=84)

	ADIS-IV	PSWQ	WAQ-Som	IUS	WW-II	SPSI-NPO	CAQ
ADIS-IV	–	.39***	.52***	.26*	.25*	.27*	.24*
PSWQ		–	.31**	.38***	.19	.29**	.16
WAQ-Som			–	.28**	.07	.30**	.26*
IUS				–	.39***	.61***	.33**
WW-II					–	.32**	.21
SPSI-NPO						–	.39***
CAQ							–

Note. ADIS-IV=Anxiety Disorders Interview Schedule for DSM-IV (Clinician's Severity Rating); PSWQ=Penn State Worry Questionnaire; WAQ-Som=Somatic subscale of the Worry and Anxiety Questionnaire; IUS=Intolerance of Uncertainty Scale; WW-II=Why Worry-II; SPSI-NPO=Negative Problem Orientation subscale of the Social Problem Solving Inventory (Revised, Short Form); CAQ=Cognitive Avoidance Questionnaire.

* *p* < .05.

** *p* < .01.

*** *p* < .001.

Table 3

Means and standard deviations for the measures of model components in the mild ($n=20$), moderate ($n=43$), and severe ($n=21$) GAD Groups

Measures	Mild GAD		Moderate GAD		Severe GAD	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
IUS *	56.75	12.44	74.19	21.07	77.19	19.33
WW-II	38.55	10.14	47.34	20.63	49.91	20.10
SPSI-NPO *	7.80	3.41	10.65	4.37	11.57	3.97
CAQ	49.50	12.96	51.07	15.66	55.38	12.99

Note. GAD=generalized anxiety disorder; IUS=Intolerance of Uncertainty Scale; WW-II=Why Worry-II; SPSI-NPO=Negative Problem Orientation subscale of the Social Problem Solving Inventory (Revised, Short Form); CAQ=Cognitive Avoidance Questionnaire.

* Mild GAD < Moderate and Severe GAD, $p < .05$.