The Impact of Written Exposure on Worry: Efficacy and Mechanisms

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Abstract

The Impact of Written Exposure on Worry: Efficacy and Mechanisms

Natalie Goldman

The main goal of this research was to examine the effect of written exposure on GAD-related symptoms in high worriers. Thirty (30) nonclinical high worriers were randomly assigned to either a written exposure condition (n = 15) or a control writing condition (n = 15). Participants in the exposure condition wrote emotional descriptions of feared outcomes, whereas participants in the control condition wrote objectively about a neutral, hypothetical situation. All participants wrote for 30 minutes each day over five consecutive days. Self-report measures were used to assess worry, GAD somatic symptoms, depression, and intolerance of uncertainty at four time points during the study: pretest, posttest, and 1- and 2-week follow-ups. Given that exposure-based treatments are effective for GAD and related symptoms (e.g., Borkovec, Wilkinson, Folensbee, & Lerman, 1983; Dugas et al., 2003), we hypothesized that the exposure group would show greater decreases in symptoms (i.e., worry, GAD somatic symptoms, and depression) than would the control group. Further, considering that changes in intolerance of uncertainty generally precede changes in worry over the course of treatment for GAD (Dugas & Ladouceur, 2000), we expected that intolerance of uncertainty scores would predict subsequent symptom scores in the exposure group. Using hierarchical linear modeling (HLM), we found that all symptoms significantly decreased over time in the written exposure group (although GAD somatic symptoms also decreased in the control group). Moreover, intolerance of uncertainty scores predicted subsequent scores on all

symptom measures in the experimental group, whereas worry and depression scores predicted subsequent intolerance of uncertainty scores in the control group.

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General Introduction

Background on Generalized Anxiety Disorder

Our understanding of generalized anxiety disorder (GAD) has increased considerably since the disorder was first introduced in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III; American Psychiatric Association [APA], 1980). The definition of GAD has also changed substantially across the editions of the DSM, as noteworthy advancements in research have been made in the field. In the DSM-III, GAD was regarded as a nonspecific and residual condition that could only be diagnosed when an individual failed to meet criteria for any other anxiety disorder (APA, 1980). However, in the subsequent publication of the DSM (DSM-III-R), substantial advancements were made in the conceptualization of GAD. Specifically, the minimal duration criterion was extended to six months and GAD was no longer considered a residual diagnostic category (it could be diagnosed in the presence of another anxiety disorder). Further, GAD was recognized as a condition in which excessive worry and anxiety were central (APA, 1987). Following the publication of the DSM-III-R, researchers began extensively studying the elements of the diagnostic criteria, focusing primarily on the nature and function of worry in GAD. This research effort resulted in the conceptualization of GAD worry as persistent and uncontrollable. Based on these findings, the diagnosis of GAD was further refined to emphasize excessive and uncontrollable worry and anxiety in addition to the inclusion of more specific somatic symptoms. In the most recent publication of the DSM (DSM-IV; APA, 1994), GAD is characterized by chronic, excessive and uncontrollable worry and anxiety about a number of events or activities, occurring more days than not for at least 6 months. Furthermore,

the diagnostic criteria of GAD include the presence of at least three out of the following six somatic symptoms: (1) restlessness or feeling keyed up or on edge; (2) being easily fatigued; (3) difficulty concentrating or mind going blank; (4) irritability; (5) muscle tension; and (6) sleep disturbance. Moreover, a diagnosis of GAD requires that the worry, anxiety and somatic symptoms lead to significant distress or impairment in important areas of functioning, and the focus of worry must not be confined to features of another Axis I disorder.

There is now evidence that GAD is one of the most common anxiety disorders, with a reported one-year prevalence rate of 3.1% and a lifetime prevalence of 5.1% (Wittchen, Zhao, Kessler, & Eaton, 1994). The National Comorbidity Survey (NCS) reported that women were twice as likely to have GAD as their male counterparts, with lifetime prevalence rates of 6.6% for women and 3.6% for men (Wittchen et al., 1994). Further, the NCS found that the highest rates of GAD were in women over the age of 45, with prevalence rates of 10.3%. The overall lifetime prevalence rates reported in the NCS are consistent with those of the Epidemiologic Catchment Area study, which found a similarly high lifetime prevalence of 5.8% for GAD (Blazer, Hughes, George, Swartz, & Boyer, 1991).

Not only is GAD now recognized as a prevalent and persistent disorder, but it is also known to be associated with considerable direct and indirect personal and social costs. For example, GAD is associated with a significant burden of disability for afflicted individuals. Studies report that GAD is related to serious impairment in role functioning and social life, and this impairment is comparable to that of major depression (Kessler, DuPont, Berglund, & Wittchen, 1999). Furthermore, the diagnosis of GAD is associated

with great economic strain due to the frequent unemployment and decreased work productivity that ensue from the disorder (Wittchen et al., 1994). For instance, a recent analysis found that 34% of patients with 12-month noncomorbid GAD showed a reduction in work productivity of 10% or more (Wittchen, Carter, Pfister, Montgomery, & Kessler, 2000). Thus, data on social relationships, employment and work productivity indicate that GAD is very costly to the individual and to society.

Another finding that provides evidence for GAD being a clinically significant mental disorder is that individuals with GAD appear to be at risk for developing numerous psychiatric and medical conditions. Studies have consistently shown that GAD is highly comorbid with other mental health problems, most commonly with major depression, panic disorder, social anxiety disorder, specific phobia, and posttraumatic stress disorder (Noyes, 2001). According to Wittchen and colleagues (1994), 66% of patients with GAD have an additional concurrent psychiatric diagnosis and 90% have a lifetime history of another psychiatric diagnosis. More specifically, a recent epidemiological study revealed that 55% of individuals with GAD had concurrent anxiety disorders and 59% had concurrent depression (Carter, Wittchen, Pfister, & Kessler, 2001). Given the degree of difficulty in successfully diagnosing and treating individuals with comorbid mental health problems, there appears to be an increased disability and a worse prognosis associated with comorbid GAD (Wittchen et al., 2000). Not only is GAD highly comorbid with psychiatric diagnoses, but studies also indicate that GAD is associated with a number of physical complaints, such as chest pain (Carter & Maddock, 1992) and irritable bowel syndrome (Lydiard, Fossey, Marsh, & Ballenger, 1993). Furthermore, research suggests that individuals with GAD have an increased risk of

developing heart disease, diabetes, and cancer (Craske, Barlow, & O'Leary, 1992). Therefore, the high occurrence of comorbidity with both mental health problems and physical complaints is further evidence that GAD is a clinically significant mental disorder that greatly impacts individuals who are afflicted with it.

Given the high rate of comorbidity with psychiatric disorders and the health risks associated with GAD, it comes as no surprise that afflicted individuals are high utilisers of primary care resources. A recent primary care study of over 20,000 attendees (the Generalized Anxiety Disorder and Depression in Primary Care study) confirmed that GAD is the most frequent anxiety disorder seen in primary care (Hoyer, Krause, Höfler, Beesdo, & Wittchen, 2001). The high prevalence of GAD in primary care settings suggests that those with the disorder have high rates of medical consultation and are frequent users of health care services. In fact, relative to patients with depression, those with noncomorbid GAD report twice the number of visits to primary care physicians (Wittchen et al., 2002). Additionally, approximately one-third of patients with GAD seek medical help for their somatic symptoms (Judd et al., 1998). Despite these high rates of primary care utilization, patients with GAD are rarely diagnosed accurately and are seldom treated for their disorder either directly or after referral to mental health specialists (Wittchen et al., 2001). Thus, there appears to be an important gap between the help-seeking behaviours of individuals with GAD and the care they actually receive.

Treatment for GAD

Considering that GAD is a prevalent, chronic, disabling condition with a substantial burden on both the individual and society, there have been recent efforts to advance the efficacy of treatment for this disorder. Considering that early treatment

interventions for GAD were relatively nonspecific and relied primarily on the management of somatic symptoms, one can easily understand that these interventions were only moderately successful (Craske, 1999; Dugas & Koerner, 2005). However, with the recent increase in research in this area, a number of theoretically driven and empirically supported conceptualizations of GAD have lead to the development of cognitive-behavioural treatments (e.g., Borkovec & Costello, 1993; Dugas et al., 2003; Wells & Paul, 2006).

One specific cognitive-behavioural treatment (CBT) protocol, developed and tested by Borkovec and Costello (1993), incorporates relaxation training, cognitive reevaluation, and imagery rehearsal of coping skills. Given that Borkovec's theory of GAD (e.g., Borkovec, Alcaine, & Behar, 2004) suggests that worry serves to avoid anxiety-provoking imagery and physiological arousal, imagery exposure to anxiety-related cues is included in this CBT package. Specifically, during exposure, clients use imagery of anxiety-provoking situations and of early cognitive and somatic anxiety cues to evoke feelings of anxiety or worry. The clients are then instructed to switch to imaginal rehearsal of coping skills as soon as they notice the actual occurrence of anxiety reactions to these images. Therefore, although this treatment component is referred to as "imagery exposure," its primary purpose is the imaginal rehearsal of coping skills rather than fear habituation via exposure.

Borkovec and Costello (1993) tested the efficacy of their treatment by comparing nondirective therapy and applied relaxation to their comprehensive CBT package. Consistent with their predictions, the authors found that applied relaxation and CBT were superior to nondirective therapy at posttreatment. However, CBT was not clearly superior

to applied relaxation at posttreatment, and although the degree of clinically significant change favoured CBT at 12-month follow-up, the difference between the treatment conditions was only moderate (57% of the CBT group achieved high endstate functioning compared to 37% of the applied relaxation group). Further attempts to improve the success of treatment by combining applied relaxation with CBT and increasing the amount of therapy have done little to improve short- and long-term treatment outcomes (e.g., Borkovec et al., 2002).

Although Borkovec and Costello's (1993) treatment package represented a significant step forward in our ability to successfully treat individuals with GAD, more recent interventions have aimed to improve therapeutic success by refining the use of exposure in treatment. While Borkovec and Costello used exposure to anxiety-provoking stimuli in their treatment of GAD, they failed to conduct exposure in a manner that supported extinction of the anxious response. Specifically, it can be argued that shifting attention to the coping response during imagery rehearsal may serve as a distraction that impedes the emotional processing of fear (Craske, 1999). In a more recently developed cognitive model of GAD, Dugas, Gagnon, Ladouceur, and Freeston (1998) propose that intolerance of uncertainty, positive beliefs about worry, negative problem orientation, and cognitive avoidance play important roles in the aetiology of GAD. Research on the model has lead to the development of a treatment protocol that ultimately aims to help clients become more tolerant of uncertainty. In the treatment protocol, imaginal exposure is used to address worries concerning hypothetical situations, with the goal of increasing tolerance of uncertainty and processing core fears.

The efficacy of the aforementioned treatment package has been tested and validated in two randomized controlled trials, both using wait-list control conditions (Dugas et al., 2003; Ladouceur et al., 2000). In the first trial (Ladouceur et al., 2000), the cognitive-behavioural treatment was offered to 26 GAD patients. Results show that the treatment was superior to the wait-list condition on all measures, and that treatment lead to statistically and clinically significant change on all outcome measures at posttreatment, with treatment gains maintained at six-month and one-year follow-ups. In addition, 77% of treated participants no longer met GAD diagnostic criteria following treatment and these numbers remained the same at one-year follow-up. In the second trial (Dugas et al., 2003), the cognitive-behavioural treatment was offered in groups of 5 to 6 participants to 52 GAD patients, again demonstrating superiority over the wait-list condition on all outcome measures (and leading to statistically and clinically significant change on all outcome measures at posttreatment and follow-ups). The treatment lead to full remission in 60% of patients at posttest, and the rate of remission increased to 95% at two-year follow-up. Taken together, these findings support the efficacy of this CBT package over wait-list conditions. Notably, although the treatment does not include an anxiety reduction technique such as applied relaxation, it nonetheless leads to clinically significant change in GAD somatic symptoms.

Overall, traditional exposure-based methods that have been integral to the successful treatment of anxiety disorders have been more difficult to implement in the treatment of GAD. Exposure-based treatments for GAD have lagged behind those for other anxiety disorders, in part because of challenges in identifying the potential target of exposure. Whereas successful treatments for other anxiety disorders have focused on

exposure to specific fearful stimuli, GAD is characterized by frequent worry about a wide range of topics that are generally future oriented and more difficult to define. As noted above, a treatment for GAD that includes imaginal exposure has been tested in two randomized controlled trials that demonstrate that the treatment leads to full remission in 60% to 77% of affected individuals (Dugas et al., 2003; Ladouceur et al., 2000). Although it is encouraging that the treatment has been found to be efficacious for most clients with GAD, a substantial proportion of treated individuals do not fully benefit from treatment, implying that the treatment could be refined.

Written Emotional Disclosure

Twenty years ago, Pennebaker and Beall (1986) published a landmark study on the beneficial effects of written emotional disclosure on physical health. Pennebaker and Beall found that students who expressed their feelings about traumatic or stressful experiences through writing reported fewer physical health complaints and visited the campus infirmary less frequently than students who wrote neutral, objective essays about how they spent their time. These results stimulated further research seeking to replicate the finding that written expression leads to positive health outcomes. In the standard written disclosure procedure, participants are assigned to partake in either written emotional disclosure or a control writing procedure, which is typically conducted for 15 to 30 minutes over 3 consecutive days. A meta-analysis conducted by Smyth (1998) on 13 studies of written emotional disclosure revealed a weighted mean effect size across all studies and outcomes of $d = .47$ ($r = .23$, $p < .0001$), which suggests that the superiority of the written disclosure procedure over a neutral writing condition is in the range of a medium effect size.

Several hypotheses have been proposed to explain the observed improvements that result from written emotional disclosure, including emotional inhibition (Pennebaker, 1989), cognitive adaptation (Park & Blumberg, 2002; Smyth, True, & Souto, 2001), and exposure to painful memories that were previously avoided (Bootzin, 1997; Sloan & Marx, 2004a). Overall, the emotional inhibition theory has not received much support as an explanation of the underlying mechanism of written exposure, leading researchers to focus on other theories. Likewise, there is a lack of consistent support for the cognitive adaptation model, in part because of the difficulty in evaluating this model empirically. Moreover, cognitive changes may be the outcome of successful exposure and thus may be explained by the exposure model. The exposure model is based on Foa and Kozak's (1986) account of emotional processing, which posits that the emotional processing of excessive fear requires the following conditions: (1) exposure to a feared stimulus; (2) full fear structure activation (represented by high initial levels of arousal), including its cognitive, behavioural, affective, and physiological referents; and (3) the incorporation of new corrective information into the fear structure (represented by habituation to stimuli across sessions). With repeated exposure to the feared stimulus, the integration of incompatible information creates new affective memories, leading to emotional change and the reduction of fear. It has been suggested that written disclosure is similar to the cognitive-behavioural interventions of *in vivo* or imaginal exposure to feared stimuli. In other words, written disclosure may lead to initial emotional arousal followed by the reduction in arousal across writing sessions, ultimately resulting in beneficial outcomes.

Based on the exposure account of written disclosure, a recent study aimed to examine the exposure hypothesis of written disclosure by investigating the emotional

reactions of participants after each writing session. Kloss and Lisman (2002) randomly assigned college students to one of three conditions: (1) traumatic or stressful experience written disclosure; (2) positive experience written disclosure; and (3) writing about a trivial topic. Participants completed measures of state anxiety immediately before and after each 20 minute writing session for 3 days in order to assess whether written disclosure induces an initial activation that then gradually decreases over the course of the sessions. In addition, participants completed questionnaires that assessed psychological and physical functioning at baseline and at nine-week follow-up. Contrary to predictions, the results did not support the exposure hypothesis, as state anxiety typically increased from pre to post writing. Moreover, the level of state anxiety did not decrease across the writing sessions and there were no significant changes from baseline to follow-up in the outcome measures. It has been suggested that the authors' hypothesis was not supported because of a measurement issue. Specifically, the measure of state anxiety was not intended to assess fear activation and a more suitable self-report measure, similar to the Subjective Units of Distress scale (SUDs) that is used in exposure, may be more appropriate to test fear activation (Sloan & Marx, 2004b).

In another study examining the exposure hypothesis of written disclosure, Sloan and Marx (2004a) randomly assigned participants with a trauma history and high levels of psychological distress to either a written disclosure or control writing condition. Participants in the written disclosure condition, compared to those in the control condition, demonstrated significantly greater emotional reactivity to the first writing session, as measured through self-report and salivary cortisol. As well, the amplified emotional reactivity was not observed at the last writing session, suggesting that

emotional reactivity had habituated across sessions. In terms of the study's main outcome measures, the results indicated that participants in the disclosure condition showed significant reductions in PTSD and depressive symptomatology and reported fewer physical health complaints at follow-up.

One important distinction between the standard exposure technique and the written disclosure procedure is that the instructions for written disclosure do not require that the person write about the same topic at each session. Contrary to this, many believe that in order for exposure to be successful, a person must repeatedly be exposed to the same traumatic experience or other feared stimulus (e.g., Foa and Rothbaum, 1998). In order to test this prediction, Sloan, Marx and Epstein (2005) systematically varied the writing instructions for the written disclosure procedure. University students with a trauma history and at least moderate posttraumatic stress symptoms were assigned to one of three conditions: (1) writing about same traumatic experience; (2) writing about different traumatic experiences; or (3) writing about nontraumatic everyday events (in each condition, participants wrote for three sessions). Only participants who wrote about the same traumatic experience in each session showed significant improvements in both psychological and physical functioning. Specifically, results revealed significant reductions in PTSD symptom severity and physical symptom complaints for the repeat disclosure group only. Furthermore, salivary cortisol samples indicated that the repeat disclosure group displayed physiological reactivity to the first session only, and that habituation occurred across the sessions. Overall, these findings provide considerable support for exposure as a mechanism for change in the written disclosure paradigm.

In summary, the research reviewed above provides evidence for the beneficial psychological and physical effects of written emotional disclosure. Moreover, the findings draw attention to the potential use of writing as a therapeutic intervention. Given that exposure mechanisms may account for the positive outcomes of written emotional disclosure, and considering that exposure-based treatments for GAD could potentially be refined, written emotional disclosure to core fears in GAD holds the promise of improving our ability to treat individuals with this common and debilitating disorder.

Running head: WRITTEN EXPOSURE FOR WORRY

The Impact of Written Exposure on Worry: A Preliminary Investigation

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Abstract

The main goal of this study was to examine the effect of written exposure on GAD-related symptoms in high worriers. Thirty (30) nonclinical high worriers were randomly assigned to either a written exposure condition (n = 15) or a control writing condition (n = 15). Participants in the written exposure condition wrote emotional descriptions of their worst fear coming true, whereas participants in the control condition wrote about a neutral, hypothetical situation in an objective way. All participants wrote for 30 minutes each day over five consecutive days. Self-report measures were used to assess worry, GAD somatic symptoms, depression, and intolerance of uncertainty at four time points during the study: pretest, posttest, and 1- and 2-week follow-ups. Given that exposure-based treatments are effective for GAD and related symptoms (e.g., Borkovec, Wilkinson, Folensbee, & Lerman, 1983; Dugas et al., 2003), we hypothesized that the exposure group would show greater decreases in symptoms (i.e., worry, GAD somatic symptoms, and depression) than would the control group. Further, considering that changes in intolerance of uncertainty generally precede changes in worry over the course of treatment for GAD (Dugas & Ladouceur, 2000), we also predicted that intolerance of uncertainty scores would predict subsequent symptom scores in the exposure group. Using hierarchical linear modeling (HLM), we found that all symptoms significantly decreased over time in the written exposure group (although GAD somatic symptoms also decreased in the control group). Moreover, intolerance of uncertainty scores predicted subsequent scores on all symptom measures in the experimental group, whereas worry and depression scores predicted subsequent intolerance of uncertainty scores in the control group.

The Impact of Written Exposure on Worry: A Preliminary Investigation

Generalized anxiety disorder (GAD) is characterized by chronic, excessive and uncontrollable worry and anxiety, as well as by somatic symptoms[1] such as restlessness, irritability, and muscle tension. Over the past two decades, research on GAD has lead to the development of a number of cognitive or cognitive-behavioural models of GAD (e.g., Borkovec, Alcaine, & Behar, 2004; Mennin, Heimberg, Turk, & Fresco, 2005; Wells & Paul, 2006). Our own group has developed a cognitive model of GAD in which intolerance of uncertainty is the central component (see, e.g., Dugas & Koerner, 2005). Intolerance of uncertainty can be understood as a dispositional characteristic that results from a set of negative beliefs about uncertainty and its implications (Dugas & Robichaud, in press). More specifically, individuals who are intolerant of uncertainty believe that uncertainty is stressful, upsetting, and should be avoided. Further, they find it difficult to function in uncertain situations (Buhr & Dugas, 2002). For the most part, research has shown that intolerance of uncertainty is specifically related to worry and GAD somatic symptoms in nonclinical and clinical populations. For example, nonclinical data suggest that intolerance of uncertainty is more highly related to worry than to obsessive-compulsive symptoms and panic sensations (Dugas, Gosselin, & Ladouceur, 2001), and clinical data show that patients with GAD have higher levels of intolerance of uncertainty than patients with panic disorder/agoraphobia (Dugas, Marchand, & Ladouceur, 2005). Research also suggests that intolerance of uncertainty may be a causal risk factor for high levels of worry and GAD. For example, changes in intolerance of uncertainty tend to precede changes in worry over the course of treatment for GAD (Dugas & Ladouceur, 2000; Dugas, Langlois, Rhéaume & Ladouceur, 1998), and the experimental

manipulation of intolerance of uncertainty leads to changes in level of worry, with increases in intolerance of uncertainty leading to more worry (Ladouceur, Gosselin & Dugas, 2000). Taken together, these findings imply that intolerance of uncertainty may play an important role in high levels of worry and GAD (Koerner & Dugas, 2006).

It is our position that one of the ways in which intolerance of uncertainty promotes worry and anxiety is through cognitive avoidance. Cognitive avoidance consists primarily of a series of internal strategies that serve to avoid distressing thoughts, including concrete mental images of feared outcomes. These avoidance strategies can be either automatic or intentionally used by the individual (Mathews, 1993). According to the avoidance theory (e.g., Borkovec et al., 2004), individuals with GAD avoid threatening mental images and their associated physiological arousal, and this avoidance maintains worry and anxiety by inhibiting complete emotional processing. Research has shown that worry is primarily made up of verbal-linguistic thought as opposed to mental imagery (Borkovec & Inz, 1990), and that verbal thoughts (such as worries) are associated with reduced physiological responding (Lang, 1985). For example, worrying has been found to prevent an increase in heart rate during subsequent exposure to a feared situation (Borkovec & Hu, 1990). Further, worrying following exposure to a stressful stimulus has been shown to lead to more intrusive thoughts about the stressor in the following days, compared to engaging in relaxation or mental imaging (Butler, Wells, & Dewick, 1995). Thus, research findings lend support to the avoidance theory of GAD, which suggests that worry and anxiety are negatively reinforced by decreases in threatening mental imagery and associated physiological responding.

The link between cognitive avoidance and intolerance of uncertainty is critical in understanding the approach-avoidance behaviour that is characteristic of GAD. Excessive worry can be conceptualized as the result of competing cognitive-motivational states as individuals with GAD engage in both excessively vigilant and avoidant behaviours (Dugas & Koerner, 2005). Research indicates that, compared to individuals who are tolerant of uncertainty, those who are intolerant of uncertainty are quicker to attend to uncertainty-denoting stimuli (Heinecke, Koerner, Dugas, & Mogg, 2006) and more likely to interpret ambiguous situations as threatening (Dugas et al., 2005). In other words, intolerance of uncertainty appears to be associated with biases in attention for, and appraisal of, ambiguous or uncertainty-related material. Thus, intolerance of uncertainty may lead to excessively vigilant behaviours that relate to the detection and interpretation of potentially problematic situations. However, research also shows that individuals with GAD, who are typically intolerant of uncertainty, believe that uncertainty should be avoided (Dugas et al., 1998). Therefore, it may be that individuals with GAD (and high worriers) are caught between vigilant and avoidant behaviours and coping strategies, which ultimately serves to amplify their worry and anxiety.

Given that intolerance of uncertainty and cognitive avoidance are two important components of Dugas and colleagues' (1998) model of GAD, the treatment that is based on this model includes modules aimed at improving clients' ability to cope with uncertainty and helping clients to process their core fears through imaginal exposure. Imaginal (or cognitive) exposure—the vivid, repetitive evocation of threatening mental imagery—is used to help clients invoke mental images of feared outcomes, activate their full fear structure, and emotionally process their fears (for a review, see Dugas &

Koerner, 2005). Imaginal exposure targets both cognitive avoidance and intolerance of uncertainty because clients learn to focus on concrete mental images of uncertain negative future events.

During treatment, an exposure scenario that describes the client's feared outcome in vivid detail is developed using first-person present tense in order to enhance mental imagery. The therapist helps the client develop an emotional description of the situation (or context), his/her reactions to the situation, and the meaning of the reactions. The client's exposure scenario is then recorded on to a looped audiotape or compact disc, and the client conducts daily exposures to this scenario which last for 30 to 60 minutes each. Imaginal exposure is conducted for approximately two to three weeks, until the core fear has been processed and worry related to the particular topic has decreased to an acceptable level.

There are both advantages and disadvantages of using a looped audiotape or a compact disc to conduct imaginal exposure during treatment. An important strength of this method is that the exposure scenario is developed with the help of the therapist during the session; this allows the therapist to know the topic of exposure and to work with the client to develop an appropriate description of the feared outcome that minimizes neutralization (any attempt to reduce the experience of anxiety while in a fearful situation). A second advantage of listening to a recording of the exposure scenario is that it requires one only to attend to the stimulus; it does not require the client to "produce" the scenario during exposure. On the other hand, there are various problems with using the looped audiotape or compact disc method of imaginal exposure. Both the client and the therapist must be comfortable with the technology and must rely on it to

work in order for exposure to be successful. This can clearly become problematic if technological difficulties are experienced.

Besides procedural difficulties, a critical theoretical weakness of audiotape- or compact disc-assisted imaginal exposure is that the exposure scenario does not vary over successive exposure sessions. Despite the efficacy of exposure treatment, a proportion of treated individuals experience a "return of fear" as previously extinguished fear responses reappear (Rachman, 1979). There has been recent interest in determining the variables that block this return of fear during training and exposure practices. The majority of research on the renewal of extinguished conditioned fear responses comes from animal learning, which demonstrates that when a conditioned stimulus (CS) that was completely extinguished in a context (B) different from the acquisition context (A) is then reintroduced in the acquisition context (A) or another context (C), a renewal of the response towards the CS is observed (e.g., Bouton & Bolles, 1979; Bouton & Swartzentruber, 1991). Likewise, human studies suggest that learning that a previously feared stimulus is safe in a specific context during treatment may not generalize to other situations. For instance, participants who were highly afraid of snakes were given one session of exposure therapy. When tested one week later, those tested in a novel context showed more return of fear than those tested in the same context (Mineka, Mystkowski, Hladek, & Rodriguez, 1999). In exposure therapy, massed, repetitious and predictable sessions may aid short term learning, but limit long term retention and generalization to other stimuli or contexts (Schmidt & Bjork, 1992). Therefore, exposure to multiple contexts is one possibility to prevent the return of fear. The limitation of listening to the same exact exposure scenario day after day is that, because it is not a varied stimulus and

is context-dependent, the extinction of fear to the stimulus may be viewed by the individual as "an exception to the rule."

Given the limitations of imaginal exposure using an audiotape or compact disc recording, we were interested in examining an alternative method of exposure; namely, written exposure. Results from two randomized controlled trials of treatments that include imaginal exposure show that the treatment leads to full remission in 60% to 77% of affected individuals (Dugas et al., 2003; Ladouceur et al., 2000). Although it is encouraging that the treatment has been found to be efficacious for most clients with GAD, a substantial proportion of treated individuals do not fully benefit from treatment, implying that the treatment could potentially be refined. The idea to incorporate writing into exposure comes from the literature on written emotional disclosure, a procedure developed by Pennebaker and Beall (1986). The procedure typically involves writing an emotional account of a stressful experience or past trauma for 15 to 30 minutes over three consecutive days. Generally, findings from these studies demonstrate that individuals who write about traumatic or stressful life experiences report fewer health complaints compared to individuals who write about emotionally neutral topics (for a review, see Smyth, 1998).

The written disclosure procedure is thought to be similar to exposure interventions in that one is repeatedly confronted with an aversive stimulus that was previously avoided. In a recent study examining the exposure model of written disclosure, Sloan and Marx (2004) investigated changes in psychological health in participants who had experienced a traumatic stressor and who reported moderate levels of posttraumatic stress symptoms. Participants were randomly assigned to either a written

disclosure condition or a control condition; those in the written disclosure condition wrote an emotional account of the most traumatic experience in their lives. All participants wrote for 20 minutes over three consecutive days, and were assessed using self-report measures at pretest, posttest and 4-week follow-up. In addition, emotional arousal in response to the writing sessions was examined using salivary cortisol. Results indicated that, compared to the control group, the disclosure group reported significantly decreased posttraumatic stress symptom severity, decreased depressive symptoms, and fewer physical symptoms at follow-up. As well, the disclosure group showed significantly greater emotional arousal to the first writing session compared with the control group, and participants in the disclosure group also displayed significant reductions in arousal across the writing sessions.

The finding that written disclosure appears to have beneficial psychological effects and that exposure is a potential mechanism responsible for these positive outcomes sparked our interest in the use of writing as a form of exposure for worriers. For the present study, we adapted Pennebaker's written disclosure paradigm to be more similar to standard exposure methods. Specifically, the writing instructions required participants to describe their worst fear coming true as if it were really happening, in vivid detail, and with the inclusion of their cognitive, behavioural and emotional reactions. Participants were required to write about the same fear over five consecutive days but were encouraged to delve deeper into the scenario each day, thereby introducing variants into their exposure scenario and potentially increasing the likelihood of more generalized and robust fear extinction.

The main goal of this preliminary study was to investigate the efficacy of written exposure in a sample of nonclinical high worriers. In the present study, we were interested in examining the effect of written exposure on worry, GAD somatic symptoms, and depression. Cognitive-behavioural treatment for GAD that targets excessive worry not only leads to reductions in worry and GAD somatic symptoms, but also reduces depressive symptoms (e.g., Dugas et al., 2003; Ladouceur et al., 2000). Therefore, we predicted that written exposure would lead to similar improvements in nonclinical high worriers. Specifically, we hypothesized that participants in the written exposure condition would show greater decreases in worry, GAD somatic symptoms, and depression compared to participants in the control writing condition. In addition, we aimed to examine the mechanisms involved in written exposure. In line with research showing that changes in intolerance of uncertainty typically predict changes in level of worry (Dugas & Ladouceur, 2000; Dugas, Langlois, et al., 1998), we hypothesized that intolerance of uncertainty would predict subsequent levels of worry, GAD somatic symptoms, and depression in the written exposure condition.

Method

Participants

Thirty participants, 20 females and 10 males between the ages of 18 and 64 years (*M* age = 26.0, *SD* = 10.2) completed the study. Of the 30 participants, 24 were full-time university students (22 were undergraduates), 5 were employed full-time, and 1 was unemployed. The participants were of diverse racial backgrounds that included European/White (n = 16), Asian or Asian-American (n = 8), Middle Eastern (n = 3), Hispanic (n = 1), East Indian (n = 1) and Bi-racial (n = 1). Participants were recruited

through notices posted on the Concordia University campus and in the community, and through classified advertisements on local university websites. The study required participants who were nonclinical high worriers, thus advertisements recruited "people who worry a lot." Potential participants were screened by phone interview by the primary investigator. The phone interview was conducted to ensure that participants were high worriers and that they met the study's inclusion criteria. Inclusion criteria were the following: (1) a score of at least 1 standard deviation above the normative mean on the Penn State Worry Questionnaire (see below); (2) absence of major depressive disorder (as defined by the DSM-IV); (3) no current involvement in psychotherapy; (4) no evidence of heart disease; (5) no medication use; and (6) not seeking treatment if meeting GAD criteria. Given that Gillis, Haaga and Ford (1995) reported a mean score of 42.2 with a standard deviation of 11.5 on the PSWQ in a community sample, we included participants who scored 54 or more on the PSWQ.

Measures

Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger & Borkovec, 1990). The original PSWQ is a 16-item scale that measures the tendency to worry excessively and uncontrollably. Examples of items on the PSWQ are "My worries overwhelm me" and "Many situations make me worry." Items are rated on a 5-point Likert scale ranging from 1 (not at all typical of me) to 5 (very typical of me). The PSWQ has high internal consistency, $\alpha = .86$ to .95, and good test-retest reliability over four weeks, $r = .74$ to .93 (Molina & Borkovec, 1994). Stöber and Bittencourt (1998) adapted the PSWQ for the weekly assessment of worry. Specifically, they changed the instructions to emphasize worry over the past week and items were rephrased to the past

tense (e.g., "Many situations made me worry"). As well, Stöber and Bittencourt changed the response scale to a 7-point rating format ranging from 1 (never) to 7 (almost always) and dropped Item 12 ("I've been a worrier all my life") because it refers to trait worry and could not be modified to fit the past week time frame. We used Stöber and Bittencourt's (1998) version of the PSWQ, but we modified their response scale to retain the original 5-point rating scale.

Worry and Anxiety Questionnaire (WAQ; Dugas et al., 2001). The WAQ contains 11 items covering DSM-IV diagnostic criteria for GAD. In the current study, we used the WAQ to determine whether individuals met GAD criteria at the four time points. In addition, we used the WAQ Somatic subscale (WAQ-Som) to assess the severity of GAD somatic symptoms. The WAQ-Som is comprised of 6 items measuring the following symptoms: restlessness or feeling keyed up or on edge, being easily fatigued, difficulty concentrating or mind going blank, irritability, muscle tension, and sleep disturbance. The WAQ demonstrates good convergent and discriminant validity and it has been shown to have satisfactory test-retest reliability (Dugas et al., 2001). In clinical samples, the WAQ is able to distinguish those with high, moderate and low levels of worry (Dugas et al., 2001). In addition, the questionnaire has demonstrated the ability to distinguish patients with GAD from nonclinical controls (Dugas et al., 2001). Consistent with the modification of the PSWQ, we modified the WAQ to refer to the past week rather than the past 6 months. Specifically, we changed the instructions to emphasize "in the past week" and we rephrased the items to the past tense (e.g., "In the past week, did your worries seem excessive or exaggerated?"). Each item is rated on a 9-point scale ranging from 0 (not at all) to 8 (very severely).

Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item scale that was initially intended as a measure of depressive severity for adults in the general population. The CES-D emphasizes the affective component of depression, depressed mood. The instructions state to indicate how often one has felt this way during the past week. Examples of items include "I thought my life has been a failure" and "I could not get going." Raters are asked to report frequency of occurrence for each of the 20 items over the past week on a 4-point scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time). The CES-D has high internal consistency in nonclinical samples, $\alpha = .85$, acceptable test-retest reliability at four weeks, $r = .67$, and demonstrated concurrent and construct validity (Radloff, 1977).

Intolerance of Uncertainty Scale (IUS; Original French version: Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994; English translation: Buhr & Dugas, 2002). The IUS consists of 27 items relating to the notion that uncertainty is unacceptable, reflects badly on a person and leads to frustration and the inability to take action. Examples of items on the IUS include "Uncertainty keeps me from living a full life" and "It's unfair not having any guarantees in life." The rater responds using a 5-point Likert scale ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). The English version of the IUS shows excellent internal consistency, $\alpha = .94$, and good test-retest reliability over five weeks, $r = .74$ (Buhr & Dugas, 2002). The IUS has been shown to be more highly related to measures of worry than to measures of obsessions or panic symptoms (Dugas et al., 2001).

Procedure

In all, 127 people contacted the primary investigator (Natalie Goldman) between May and October 2005 and were interested in participating in the study. A structured phone interview developed in our earlier studies (Dugas et al., 2003; Ladouceur et al., 2000) was used to assess whether participants met inclusion criteria for the study. Following the phone interview, 89 people were excluded from the study: 40 scored below the cut-score on the PSWQ, 31 met criteria for major depressive disorder, 7 were currently taking psychotropic medication, 6 were currently in therapy, and 5 met criteria for GAD and were seeking treatment. Of the 38 people who met inclusion criteria, 8 people did not attend the first session or were not able to commit to the time requirement of the study. Therefore, the final sample of participants included in the study was 30.

Those who met inclusion criteria and were willing to participate in the study were scheduled to come to the laboratory for a total of 8 sessions. Twenty (20) female participants were randomly assigned to either the experimental group (n = 10) or the control group (n = 10), and 10 male participants were randomly assigned to either the experimental group (n = 5) or the control group (n = 5). On arrival for the first session, the purpose of the study was explained and participants provided informed written consent. The primary investigator notified participants that previous research suggests that writing can have positive effects on health and that the goal of the current study was to explore the relationship between writing and worry. Participants were also informed that their participation in the study was voluntary and that they were free to withdraw at any time without negative consequences.

Participants then completed a package of questionnaires, which included a socio-demographic questionnaire, the PSWQ, the WAQ, the CES-D, and the IUS. The first writing session followed the completion of these questionnaires. Specific writing instructions for each writing condition were read to each participant and were left in the room with the participant to refer to during the session (see Appendix A for exact instructions). Participants in the written exposure condition were asked to write a scenario describing their worst fear coming true with as much emotion as possible. They were instructed to describe the situation in great detail, describing their physical sensations, feelings and reactions. Participants were told to write about the same feared situation for all five writing sessions, but that they could go deeper into their scenario with each successive session. Participants in the control condition were instructed to write an unemotional story about a future hypothetical situation. Specifically, they were asked to write a story describing what they would do if they found out that they had the day off work. All participants wrote for 30 minutes.

With the exception of the questionnaires, the same procedure was replicated for the writing sessions that occurred on the following four days. Participants then returned to complete the same package of questionnaires for posttest assessment three days later, and again for follow-up assessment 1- and 2- weeks subsequent to the posttest assessment. We chose to assess posttest three days after the last writing session (on the following Monday) because an assessment taken immediately following the last writing session (on the Friday) would be inflated by the preceding exposure, rather than accurately measuring the effects of the entire exposure treatment. After the final follow-

up session, participants were debriefed by the primary investigator and were given monetary compensation ($75.00) for their time.

Results

Preliminary Analyses

Independent samples t-tests revealed no significant between-group differences on age and on measures of worry, GAD somatic symptoms, and depression. However, there were baseline group differences on the measure of intolerance of uncertainty, with a mean of 88.40 (SD = 15.09) for the experimental group and a mean of 74.67 (SD = 20.75) for the control group; t (28) = -2.07, $p < .05$. Descriptive data for all variables in the analyses are reported in Table 1.

At pretest, 60% (n = 18) of the total sample of participants met full criteria for GAD and 63.3% (n = 19) met the somatic criteria for GAD. At pretest, there were no between-group differences in the number of participants who met full criteria (experimental group = 10, control group = 8; $\chi^2 = 0.50$, $df = 1$) and somatic criteria (experimental group = 10, control group = 9; $\chi^2 = 0.71$, $df = 1$). At 2-week follow-up, only 20% (n = 2) of participants in the experimental group who met full criteria at pretest continued to meet diagnostic criteria for GAD, whereas 75% (n = 6) of participants in the control group who met full criteria at pretest continued to meet the same criteria.

Overview of data analytic approach

Hierarchical linear modeling (HLM Version 6; Raudenbush & Bryk, 2002) was used to analyze the data. HLM is used to study hierarchically organized data, where units of observation at one level are nested in units of observation at a higher level.

Longitudinal data can be considered to have a hierarchical structure, where occasions of measurement are nested within subjects. Hierarchical linear models simultaneously analyze individual and temporal relationships. The Level 1 model represents multiple observations nested within individuals, such as change in worry across four assessment times for each participant. Level 2 models test for differences in the trajectories of Level 1 variables; therefore, they represent the variation across individuals, such as different trajectories of worry over time between two conditions in a treatment. In our HLM analyses, all predictor variables entered into the models were uncentred.

Outcome measures

In order to obtain preliminary information on how much variation in the outcome lies within individuals and between groups, we began by running one-way random effects ANOVA models in HLM for each of the outcome measures (PSWQ, WAQ-Som, and CES-D). Next, we added Time as a Level-1 predictor in order to assess the slopes for the PSWQ, the WAQ-Som, and the CES-D. We found that the Time slope was significant for all outcome measures, indicating that all outcome measures significantly changed over time.

Next, we included Gender and Group into the model to determine whether change over time on each of the outcome variables differed depending on Gender (male or female) and Group membership (experimental group or control group). Separate analyses were conducted for each of the study variables. The results show that Gender was not a significant predictor of PSWQ slope (coefficient = -2.51, t [-1.70], $p > .05$, *ns*), WAQ-Som slope (coefficient = -0.1, t [-0.09], $p > .05$, *ns*), or CES-D slope (coefficient = -0.51, t [-0.60], $p > .05$, *ns*). The results also show that Group was not a significant predictor of

PSWQ slope (coefficient = -1.77, *t* [-1.24], $p > .05$, *ns*), WAQ-Som slope (coefficient = -0.79, *t* [-0.70], $p > .05$, *ns*), or CES-D slope (coefficient = -0.92, *t* [-0.95], $p > .05$, *ns*). Thus, contrary to our expectation, the groups did not significantly differ in their PSWQ, CES-D, and WAQ-Som slopes. Taken together, these findings indicate that all three outcome variables significantly decreased over time in our sample; however, there were no differences between the experimental and control groups in the slope of these variables.

Given the previously reported results, we decided to examine changes in PSWQ, WAQ-Som, and CES-D scores within each group separately by comparing each measure's slope to a slope of zero (a slope of zero denotes no change over time). First, we found that the PSWQ slope was significantly different from zero in the experimental group (coefficient = -3.58, *t* [-3.75], $p < .01$), but not in the control group (coefficient = -1.81, *t* [-1.60], $p > .05$, *ns;* see Figure 1). Second, we found that the WAQ somatic slope was significantly different from zero in both the experimental group (coefficient = -3.24, *t* [-4.24], $p < .01$) and the control group (coefficient = -2.45, *t* [-2.96], $p < .01$; see Figure 2). Finally, we found that the CES-D slope was significantly different from zero in the experimental group (coefficient = -1.87, *t* [-2.43], $p < .05$), but not in the control group (coefficient = -0.95, *t* [-1.63], $p > .05$, *ns;* see Figure 3). In other words, PSWQ and CES-D scores significantly decreased over time in the experimental group only, whereas WAQ-Som scores significantly decreased over time in both groups.

Process Measures

We also used HLM to assess the temporal relationship among the variables. Specifically, we examined if scores on a given measure predict scores at the next time

point on another measure, when controlling for their relationship at the same time point. For example, we entered PSWQ as an outcome variable and IUS at the same time point and IUS and the previous time point as the predictor variables. The intercept and the two predictors (same time point and previous time point) were set as random effects in the model to see if there was variance left to be explained in Level 2. Because there was no between-subject variance in this model, we fixed the two predictors and reran the model. Fixing the predictor variables is consistent with our expectation that the relationship between the variables will be the same for everyone; for example, it is in line with the hypothesized causal relationship between intolerance of uncertainty and worry.

In the experimental group, we first examined if intolerance of uncertainty predicted worry, GAD somatic symptoms, and depression. Our analyses revealed that IUS at the previous time point predicted: (1) PSWQ at the following time point (coefficient = 0.42, t [2.63], $p < .01$); (2) WAQ-Som at the following time point (coefficient = 0.19, t [2.49], $p < .05$); and (3) CES-D at the following time point (coefficient = 0.27, t [2.34], $p < .05$). We were also interested in knowing if worry, GAD somatic symptoms, and depression predicted intolerance of uncertainty in the experimental group. Unlike the previous set of analyses, these analyses revealed no significant results (see Table 2 for variance explained in Level 1 precedence of change analyses).

In the control group, we ran the same two sets of analyses and found very different results. In the first set of analyses, we found that IUS scores at the previous time point did not predict any of the symptom measure scores at the following time point. In the second set of analysis, we found that: (1) PSWQ scores at the previous time point

predicted IUS scores at the following time point (coefficient = 0.20, t [2.42], $p < .05$); and (2) CES-D scores at the previous time point also predicted IUS scores at the following time point (coefficient = .39, t [2.00], $p < .05$). Taken together, the process analyses show that IUS scores predicted subsequent scores on all symptom measures in the experimental group, and that PSWQ and CES-D scores predicted subsequent IUS scores in the control group.

Discussion

The main purpose of this study was to examine the impact of writing about feared outcomes in a nonclinical sample of high worriers. The first hypothesis, which postulated that participants in the written exposure condition would show greater decreases in self-report measures of worry, GAD somatic symptoms, and depression than participants in a control writing condition, was partially supported. Although changes in worry, GAD somatic symptoms, and depression did not differ between groups, the results revealed significant negative slopes for all symptoms in the experimental group, whereas only GAD somatic symptoms had a negative slope in the control group. As expected, worry, GAD somatic symptoms, and depression scores for participants in the written exposure condition significantly decreased over time. This is in line with findings from two randomized clinical trials that revealed reductions in worry, GAD somatic symptoms, and depression following GAD treatment that included imaginal exposure (Dugas et al., 2003; Ladouceur et al., 2000). Furthermore, the results of this study suggest that written exposure is effective at improving GAD symptoms in so far as 80% of nonclinical participants who initially met GAD criteria no longer met criteria at 2-week follow-up. This finding is encouraging when compared to the result that only 25% of participants in

the control group who met full criteria at pretest no longer met the same criteria at 2-week follow-up. These results further support the clinical utility of exposure procedures in reducing excessive worry.

An additional and unexpected finding was the significant negative slope for GAD somatic symptoms in the control group. Although this finding is surprising, we propose two hypotheses to explain the result. First, participants in the control condition may have improved because of the expectation that writing leads to improvements in physical health. Before the first writing session, all participants were informed that research suggests that writing can have positive effects on health and that the goal of the current study was to explore the relationship between writing and worry. It is possible that this statement induced the expectation of improvement as a result of participation in the study. Placebo effects may have been more pronounced for GAD somatic symptoms, compared to the other GAD symptoms, because the somatic symptoms are more similar to physical symptoms (e.g., muscle tension). Another possible explanation for the significant negative slope in GAD somatic symptoms in the control group is the test effect of repeatedly administering self-report measures within a short time frame. Sharpe and Gilbert (1998) found that the repeated administration of the Beck Depression Inventory (BDI) to a nonclinical sample at 1-week intervals over three weeks lead to a 25% decrease in mean scores on the measure. This is in line with past research that found unexpected decreases in negative mood measures, such as the BDI, in no-treatment control groups (e.g., Choquette & Hesselbrock, 1987). Therefore, we speculate that the positive expectation of improvement in health combined with the decrease in self-report

scores potentially due to testing effects may have lead to the decrease in GAD somatic symptoms in the control group.

Our second hypothesis, which stated that intolerance of uncertainty would predict subsequent levels of worry, GAD somatic symptoms, and depression in the experimental group, was supported. As expected, process analyses indicated that intolerance of uncertainty scores predicted subsequent scores on the measures of worry, GAD somatic symptoms, and depression for participants performing written exposure. These findings are in line with research showing that changes in intolerance of uncertainty generally precede changes in worry for patients with GAD receiving CBT (Dugas & Ladouceur, 2000; Dugas et al., 1998). The present findings are also consistent with previous data showing that changes in intolerance of uncertainty over CBT can predict GAD symptom scores at posttreatment and at follow-ups of up to two years (Dugas, Ladouceur, Léger, et al., 2003).

Although these findings are preliminary, they are important because they support the relationship between intolerance of uncertainty and cognitive avoidance and also the use of exposure to target these processes. Writing about feared outcomes may be beneficial for excessive worriers because it decreases intolerance of uncertainty by making the possibility of a future event less threatening. As noted previously, individuals with GAD avoid threatening mental imagery; thus, exposure serves to decrease avoidance and enhance the emotional processing of their fear. Our findings are intriguing because the written exposure procedure did not *directly* target intolerance of uncertainty, yet changes in intolerance of uncertainty as a result of the exposure task appeared to play an important role in leading to improvements in GAD symptoms.

Unexpectedly, the results indicate that worry and depression scores predicted subsequent levels of intolerance of uncertainty in the control group. We speculate that this may be due to an expectation that the writing procedure would lead to positive effects, as mentioned previously. Again, the expectation that writing may improve health could have lead to decreases in GAD symptoms, which in turn lead to decreases in intolerance of uncertainty. This finding can be explained by examining the role of hope and expectancy in treatment and the finding that positive therapeutic expectations lead to improvements in treatment outcome. For instance, agoraphobic participants who were provided with therapeutic expectancies of *in vivo* exposure showed substantially greater and more rapid improvement than participants who were led to believe that the exposure was for the purpose of assessment (Southworth & Kirsch, 1988). Our finding that GAD symptom scores predicted subsequent intolerance of uncertainty scores in the control group can be understood in terms of the bidirectional relationship between cognitive processes and symptoms. Although the model of GAD proposed by Dugas et al. (1998) suggests that worry is a symptom of the chain of events initiated by the activation of intolerance of uncertainty, worry *also* feeds back into the system and has an active reciprocating role in perpetuating cognitive processes such as intolerance of uncertainty. This situation is not unique as self-perpetuating mechanisms have been described more explicitly in at least two other empirically-supported accounts of excessive worry, namely Borkovec's avoidance theory (see Borkovec et al., 2004) and Wells' metacognitive theory (see Wells & Paul, 2006). In other words, while changes in cognitive processes such as intolerance of uncertainty lead to changes in symptoms of GAD, changes in symptoms also affect one's tolerance of uncertainty. It is reasonable to assume that

experiencing a general improvement in mood will in turn affect how one processes information and interprets uncertainty. In addition, a bidirectional relationship between worry and anxiety has been demonstrated for participants receiving treatment for GAD (Francis, Dugas, & Bouchard, 2004), and this is consistent with a model of psychopathology that posits a bidirectional relationship between cognitive, affective and somatic subsystems. It has been suggested that change in one aspect of anxiety (cognitive or somatic) leads to change in other aspects of anxiety, so that treatment that affects change in one subsystem will interact with other subsystems to produce overall improvements (Borkovec et al., 2002).

The present findings suggest the use of writing as an alternative form of exposure in the treatment of worry may be clinically useful. As mentioned previously, the use of written exposure has a number of advantages over conventional methods of exposure: (1) it is relatively easy to administer; (2) it is cost-effective; (3) it can provide a greater variability of exposure contexts; and (4) it can potentially protect against the return of fear. Further, although imaginal exposure in the treatment of GAD is typically conducted for two to three weeks (see Dugas & Robichaud, in press), the findings of the current study suggest that writing over just five consecutive days can have an impact on worry, GAD somatic symptoms, and depressive symptoms. Finally, because writing eliminates the possibility of technological difficulties that can interfere with compliance, it is likely that most therapists and clients will find writing a convenient method to be used in treatment. As noted earlier, however, written exposure also has certain disadvantages. For example, it could be argued that clients are at increased risk to neutralize during exposure, as the therapist is not involved in the development of each written exposure

scenario. Nevertheless, given the recent findings with regard to the importance of varying exposure context to prevent the return of fear, written exposure may be superior to audiotape- or compact disc-assisted exposure because it facilitates the use of varied contexts during the different exposure sessions.

Several limitations of the present study should be noted. First and foremost, the small sample size (n = 15 per group) provided limited statistical power for our analyses and placed limits on the generalizability of our findings. It is conceivable that group differences would have been observed with a larger sample size. In addition, despite finding consistent effects in our process analyses, we noted considerable between-subjects variability that was not explained by our results. Given the small sample size and limited statistical power, we chose to bypass the analysis of between-subject differences such as gender and age in the process analyses. Therefore, due to the high variability and heterogeneity of the sample, our results are just one element of the variability that was explained. Another potential limitation of this study is the use of self-report measures to assess worry, GAD somatic symptoms, GAD criteria, and depression. Future studies can overcome this limitation by using clinician ratings to assess change in GAD symptoms and criteria. Furthermore, the results of the study could be enhanced with a longer follow-up time frame. For participants in the control group, GAD symptoms declined during the writing period and generally leveled off during the follow-up period. In contrast, for participants conducting written exposure, GAD symptoms continued to decline during the two-week follow-up. This may indicate that additional measurements over a longer time frame would capture further decreases in symptoms following written exposure, and thus, would provide greater differences between the groups. Thus, further assessments

over a longer follow-up period would enhance our understanding of the value of written exposure.

In summary, it may be that five consecutive 30-minute sessions of written exposure is sufficient to lead to decreases in worry, GAD somatic symptoms, and depression in nonclinical high worriers. The results of this study have important implications in the treatment of GAD and worry related disorders. Given that written exposure shows promise as a means of helping nonclinical individuals decrease their worry, somatic symptoms and depression, it may have the potential for helping clinical populations of excessive worriers. Written exposure is a convenient, relatively easy, and cost-effective form of exposure that could be utilized in treatment interventions. Thus, future studies in clinical populations are required to ascertain if written exposure can be helpful for individuals suffering from GAD and other worry-related disorders.

References

Borkovec, T. D., Alcaine, O., & Behar, E. (2004). Avoidance theory of worry and generalized anxiety disorder. In R. G. Heimberg, C. L. Turk, & D. S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice,* pp. 77-108. New York: Guilford Press.

Borkovec, T. D. & Inz, J. (1990). The nature of worry in generalized anxiety disorder: A predominance of thought activity. *Behaviour Research and Therapy, 28*, 69-73.

Borkovec, T. D., & Hu, S. (1990). The effect of worry on cardiovascular response to phobic imagery. *Behaviour Research and Therapy, 28,* 69-73.

Borkovec, T. D., Newman, M. G., Pincus, A. L., & Lytle, R. (2002). A component analysis of cognitive-behavioural therapy for generalized anxiety disorder and the role of interpersonal problems. *Journal of Consulting and Clinical Psychology, 70*, 288-298.

Borkovec, T. D., Wilkinson, L., Folensbee, R., & Lerman, C. (1983). Stimulus control applications to the treatment of worry. *Behaviour Research and Therapy, 21*, 247-251.

Bouton, M. E., & Bolles, R. C. (1979). Role of conditioned contextual stimuli in reinstatement of extinguished fear. *Journal of Experimental Psychology: Animal Behavior Processes*, 5, 368–378.

Bouton, M. E., & Swartzentruber, D. (1991). Sources of relapse after extinction in Pavlovian and instrumental learning. *Clinical Psychology Review, 11*, 123–140.

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy*, *40,* 931–945.

Butler, G., Wells, A., & Dewick, H. (1995) Differential effects of worry and imagery after exposure to a stressful stimulus: A pilot study. *Behavioural and Cognitive Psychotherapy, 23*, 45-56.

Choquette, K. A. & Hesselbrock, M. N. (1987). Effects of retesting with the Beck and Zung depression scales in alcoholics. *Alcohol and Alcoholism, 22*, 217-283.

Dugas, M. J., Freeston, M. H., Provencher, M. D., Lachance, S., Ladouceur, R., & Gosselin, P. (2001). Le Questionnaire sur l'Inquietude et l'Anxiete: Validation dans des echantillons non cliniques et cliniques [The Worry and Anxiety Questionnaire: Validation in nonclinical and clinical samples]. *Journal de Therapie Comportementale et Cognitive, 11,* 31–36.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215-226.

Dugas, M. J., Gosselin, P., & Ladouceur, R. (2001). Intolerance of uncertainty and worry: Investigating specificity in a nonclinical sample. *Cognitive Therapy and Research, 25*, 551-558.

Dugas, M. J., & Koerner, N. (2005). Cognitive-behavioural treatment for generalized anxiety disorder: Current status and future directions. *Journal of Cognitive Psychotherapy: An International Quarterly, 19,* 61-81.

Dugas, M. J., Ladouceur, R., Léger, E., Freeston, M. H., Langlois, F., Provencher, M. D., et al., (2003). Group cognitive-behavioral therapy for generalized anxiety disorder: Treatment outcome and long-term follow-up. *Journal of Consulting and Clinical Psychology, 71*, 821–825.

Dugas, M. J., & Ladouceur, R. (2000). Treatment of GAD: Targeting intolerance of uncertainty in two types of worry. *Behavior Modification, 24*(5), 635-657.

Dugas, M. J., Langlois, F., Rhéaume, J., & Ladouceur, R. (1998, November). *Intolerance of uncertainty and worry: Investigating causality*. In J. Stoeber (chair), Worry: New findings in applied and clinical research. Symposium: Association for Advancement of Behavior Therapy, Washington, DC.

Dugas, M. J., Marchand A., & Ladouceur R. (2005). Further validation of a cognitive-behavioral model of generalized anxiety disorder: Diagnostic and symptom specificity. *Journal of Anxiety Disorders, 19*, 329-343

Dugas, M. J., & Robichaud, M. (in press). *Cognitive-behavioral treatment for generalized anxiety disorder: From science to practice.* New York: Routledge.

Francis, K., Dugas, M. J., & Bouchard, S. (2004, November). *Investigating Change in Worry And Anxiety During Cognitive-Behavioural Therapy and Applied Relaxation for Generalized Anxiety Disorder.* Poster session presented at the Annual Convention for the Association for Advancement of Behavior Therapy, New Orleans, LA.

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences,17,* 791–802.

Gillis, M. M., Haaga, D. A. F., & Ford, G. T. (1995). Normative values for the Beck Anxiety Inventory, Fear Questionnaire, Penn State Worry Questionnaire, and Social Phobia and Anxiety Inventory. *Psychological Assessment, 7*, 450-455.

Heinecke, N., Koerner, N., Dugas, M. J., & Mogg, K. (2006, July). *The relation between intolerance of uncertainty and attentional biases.* Poster presented at the annual

convention of the British Association for Behavioural and Cognitive Psychotherapies, Warwick, United Kingdom.

Koerner, N. & Dugas, M. J. (2006). A cognitive model of generalized anxiety disorder: The role of intolerance of uncertainty. In G.C.L. Davey and A. Wells (Eds.) *Worry and Its Psychological Disorders: Theory, Assessment and Treatment.* England: John Wiley & Sons.

Ladouceur, R., Dugas, M. J., Freeston, M. H., Léger, E., Gagnon, F., & Thibodeau, N. (2000). Efficacy of a cognitive-behavioral treatment for generalized anxiety disorder: Evaluation in a controlled clinical trial. *Journal of Consulting and Clinical Psychology, 68*, 957-964.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: A study of a theoretical model of worry. *Behavior Research and Therapy, 38,* 933-941.

Lang, P. J. (1985). The cognitive psychophysiology of emotion: Fear and anxiety. In A. Tuma & J. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 131-170). Hillsdale, NJ: Lawrence Erlbaum associates.

Mathews, A. (1993). Attention and memory for threat in anxiety. In H. W. Krohne (Ed.), *Attention and avoidance: Strategies in coping with aversiveness* (pp. 119-135). Kirkland, WA: Hogrefe & Huber.

Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2005). Preliminary evidence for an emotion regulation deficit model of generalized anxiety disorder. *Behaviour Research and Therapy, 43*, 1281-1310.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28,* 487–496.

Mineka, S., Mystkowski, J. L., Hladek, D., & Rodriguez, B. I. (1999). The effects of changing contexts on return of fear following exposure therapy for spider fear. *Journal of Consulting and Clinical Psychology, 67,* 599–604.

Molina, S., & Borkovec, T. D. (1994). The Penn state worry questionnaire: psychometric properties and associated characteristics. In G. C. L. Davey, & F. Tallis (Eds.), *Worrying: Perspectives on theory, assessment and treatment* (pp. 265–283). Chichester, England: Wiley.

Pennebaker, J. W., & Beall, S. K. (1986). Confronting a traumatic event: Toward an understanding of inhibition and disease. *Journal of Abnormal Psychology, 95,* 274-281.

Rachman, S. J. (1979). The return of fear. *Behaviour Research and Therapy, 17,* 164–165.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401.

Raudenbush, S. W., & Bryk, A. S. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods* (2 ed.). Thousand Oaks, California: Sage Publications.

Schmidt, R. A., & Bjork, R. A. (1992). New conceptualization of practice: Common principles in three paradigms suggest new concepts for training. *Psychological Science, 3,* 207-217.

Sharpe, J. P., & Gilbert, D. G. (1998). Effects of repeated administration of the Beck Depression Inventory and other measures of negative mood states. *Journal of Personality and Individual Differences, 24,* 457-463.

Sloan, D. M., & Marx, B. P. (2004). A closer examination of the structured written disclosure procedure. *Journal of Consulting and Clinical Psychology, 4*, 165-175.

Smyth, J. (1998). Written emotional expression: Effect sizes, outcome types, and moderating variables. *Journal of Consulting and Clinical Psychology, 66,* 174-184.

Southworth, S., & Kirsch, I. (1988). The role of expectancy in exposure-generated fear reduction in agoraphobia. *Behaviour Research and Therapy, 26,* 113-120.

Stober, J., & Bittencourt, J. (1998). Weekly assessment of worry: An adaptation of the Penn State Worry Questionnaire for monitoring changes during treatment. *Behaviour Research and Therapy 36,* 645-656.

Wells, A. & King, P. (2006). Metacognitive therapy for generalized anxiety disorder: An open trial. *Journal of Behavior Therapy and Experimental Psychiatry, 37,* 206–212.

Author Note

Footnotes

[1] Although the term "somatic symptoms" is not entirely accurate to describe these GAD symptoms, we have retained this term to be consistent with our previous writings and the broader GAD literature.

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Table 1

Means and Standard Deviations on Study Measures at Pretest, Posttest, and 1- and 2-week Follow-ups for Experimental (n = 15) and Control (n = 15) Groups

		Pretest		Posttest		1-week follow-up		2-week follow-up	
Variable and group		*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
PSWQ									
	Experimental	58.40	5.41	53.40	11.36	49.60	8.20	47.73	11.16
	Control	58.13	8.68	52.80	10.96	50.67	14.22	52.80	14.16
WAQ-Som									
	Experimental	27.60	9.16	23.27	7.55	20.27	9.33	17.80	7.99
	Control	27.93	8.05	22.00	11.12	21.27	12.12	20.00	11.56
CES-D									
	Experimental	22.60	9.12	21.87	8.77	21.13	8.35	16.60	5.25
	Control	20.80	8.62	17.40	8.47	18.07	9.98	17.40	9.50
IUS									
	Experimental	88.40	15.09	80.08	20.26	79.93	22.39	80.67	23.26
	Control	74.67	20.75	68.40	24.28	67.00	28.06	66.47	29.81

Note. PSWQ = Penn State Worry Questionnaire; WAQ-Som = Worry and Anxiety Questionnaire - Somatic subscale; CES-D = The Center for Epidemiologic Studies Depression Scale; IUS = Intolerance of Uncertainty Scale.

Table 2

Variance Explained in Level 1 Hierarchical Linear Modeling Analyses of Variables Preceding Change on Outcome Measures over Time for Experimental (n = 15) and Control (n = 15) Groups

	Original Model Estimates	With Fixed Effect of Same Time Point Added		With Fixed Effect of Preceding Time Point Added		With Fixed Effect of Same and Preceding Time Points Added		
	Sigma squared	Sigma squared	Variance Explained	Sigma squared	Variance Explained	Sigma squared	Variance Explained by Time Point	
Fixed Effect							Same	Preceding
IUS → PSWQ								
Experimental	68.82	63.39	0.08	48.08	0.30	49.10	-0.02	0.23*
Control	40.46	40.76	-0.01	41.00	-0.01	41.93	-0.02	-0.03
PSWQ → IUS								
Experimental	26.83	24.93	0.07	26.29	0.02	24.56	0.07*	0.01
Control	24.36	25.11	-0.03	21.51	0.17	22.19	-0.03	0.12*
IUS → WAQ-Som								
Experimental	29.33	24.85	0.15	21.87	0.25	21.46	0.02	0.14*
Control	18.64	17.75	0.05	19.03	-0.02	18.34	0.04*	-0.03

WAQ-Som → IUS								
	Experimental	26.83	22.55	0.16	27.02	-0.01	23.34	0.14**	-0.04
	Control	24.36	23.39	0.04	22.60	0.07	21.50	0.05	0.08
IUS → CES-D								
	Experimental	44.60	40.32	0.10	35.25	0.21	36.08	-0.02	0.12*
	Control	12.71	11.87	0.07	13.11	-0.03	12.06	0.08*	-0.02
CES-D → IUS								
	Experimental	26.83	24.16	0.10	24.93	0.07	22.43	0.10*	0.07
	Control	24.36	23.05	0.05	23.74	0.03	20.59	0.13*	0.06*

Note. IUS = Intolerance of Uncertainty Scale; PSWQ = Penn State Worry Questionnaire; WAQ-Som = Worry and Anxiety Questionnaire – Somatic subscale; CES-D = The Center for Epidemiologic Studies Depression Scale.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Figure Captions

Figure 1. PSWQ slopes for the experimental group (n = 15) and the control group (n = 15).

Figure 2. WAQ-Som slopes for experimental (n = 15) and control groups (n = 15).

Figure 3. CES-D slopes for experimental (n = 15) and control groups (n = 15).

Figure 1. PSWQ slopes for the experimental group (n = 15) and the control group (n = 15).

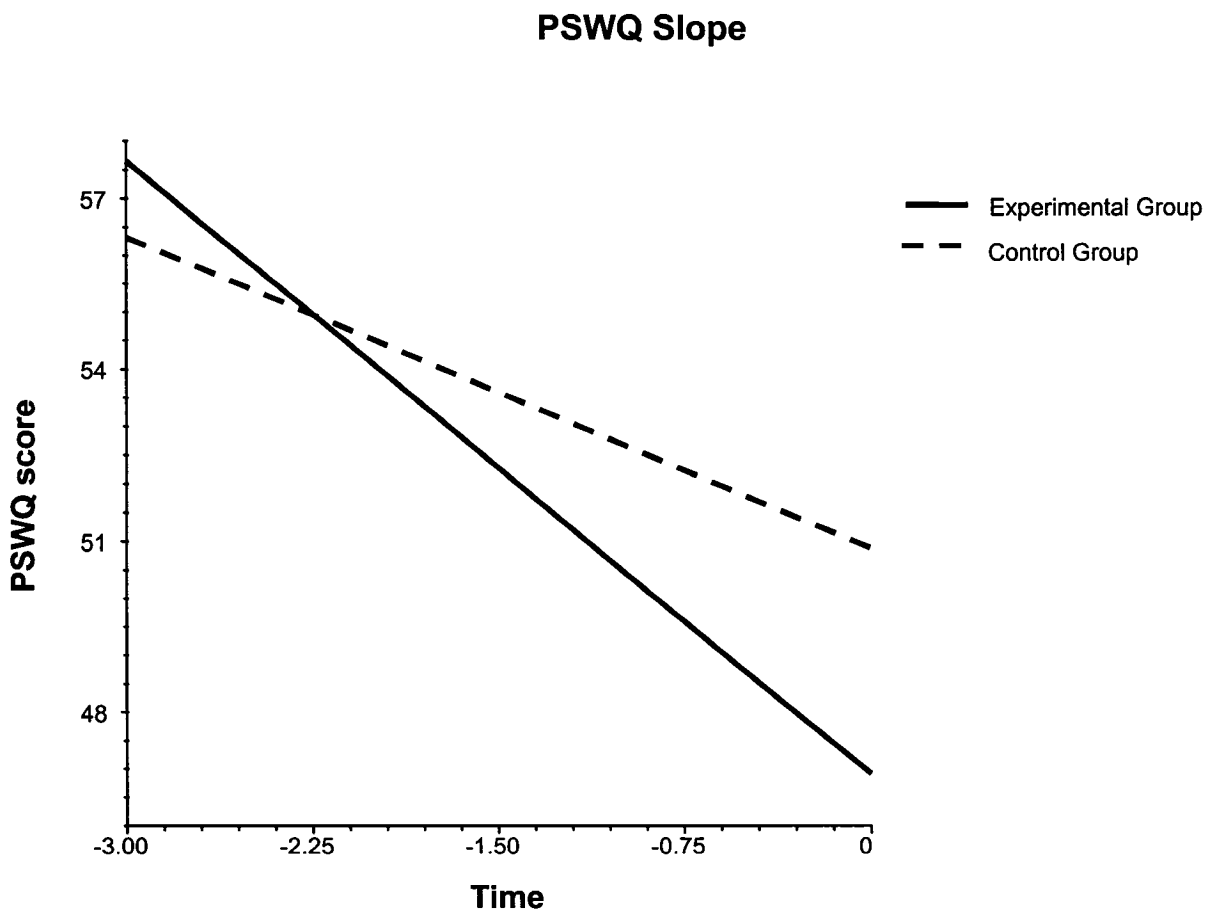


Figure 2. WAQ-Som slopes for experimental (n = 15) and control groups (n = 15).

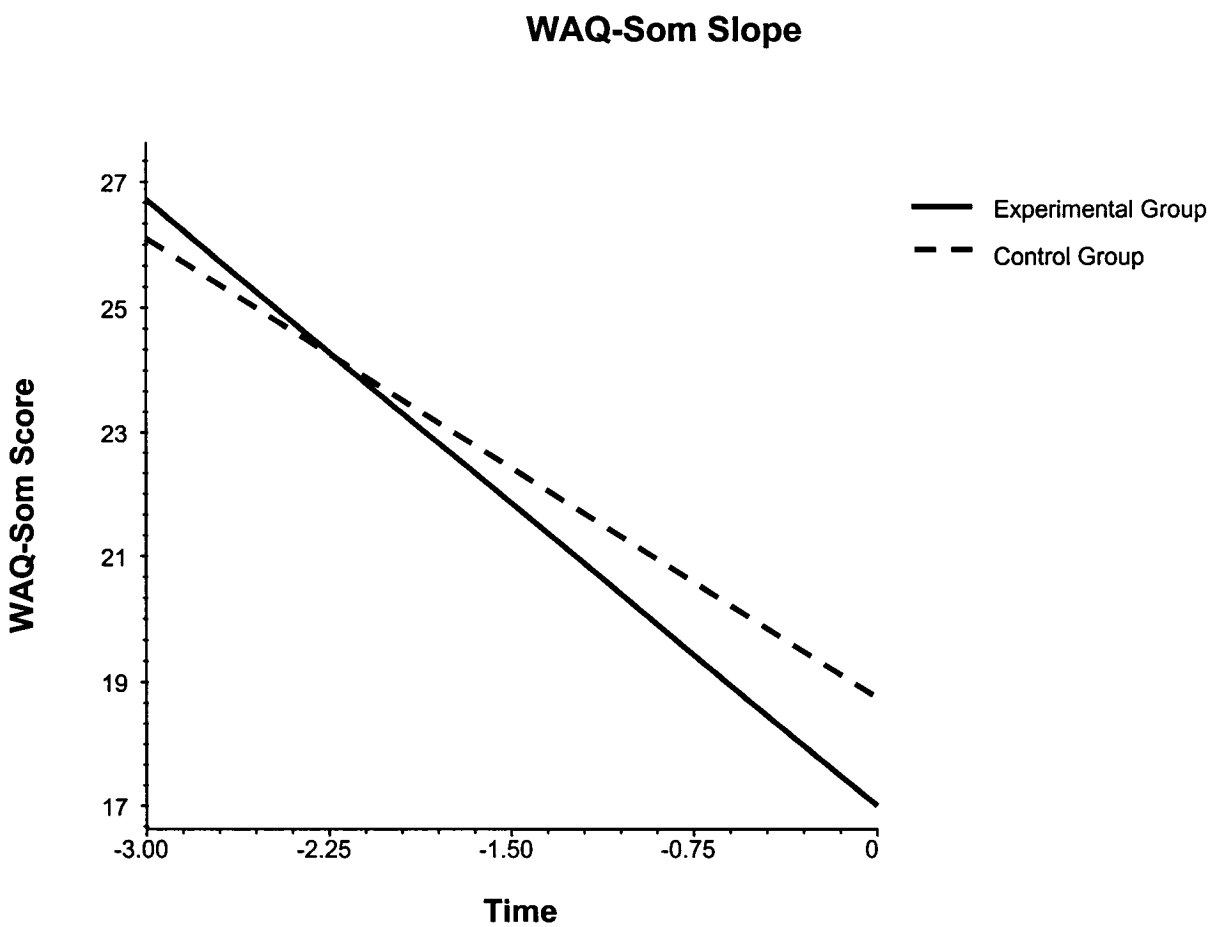
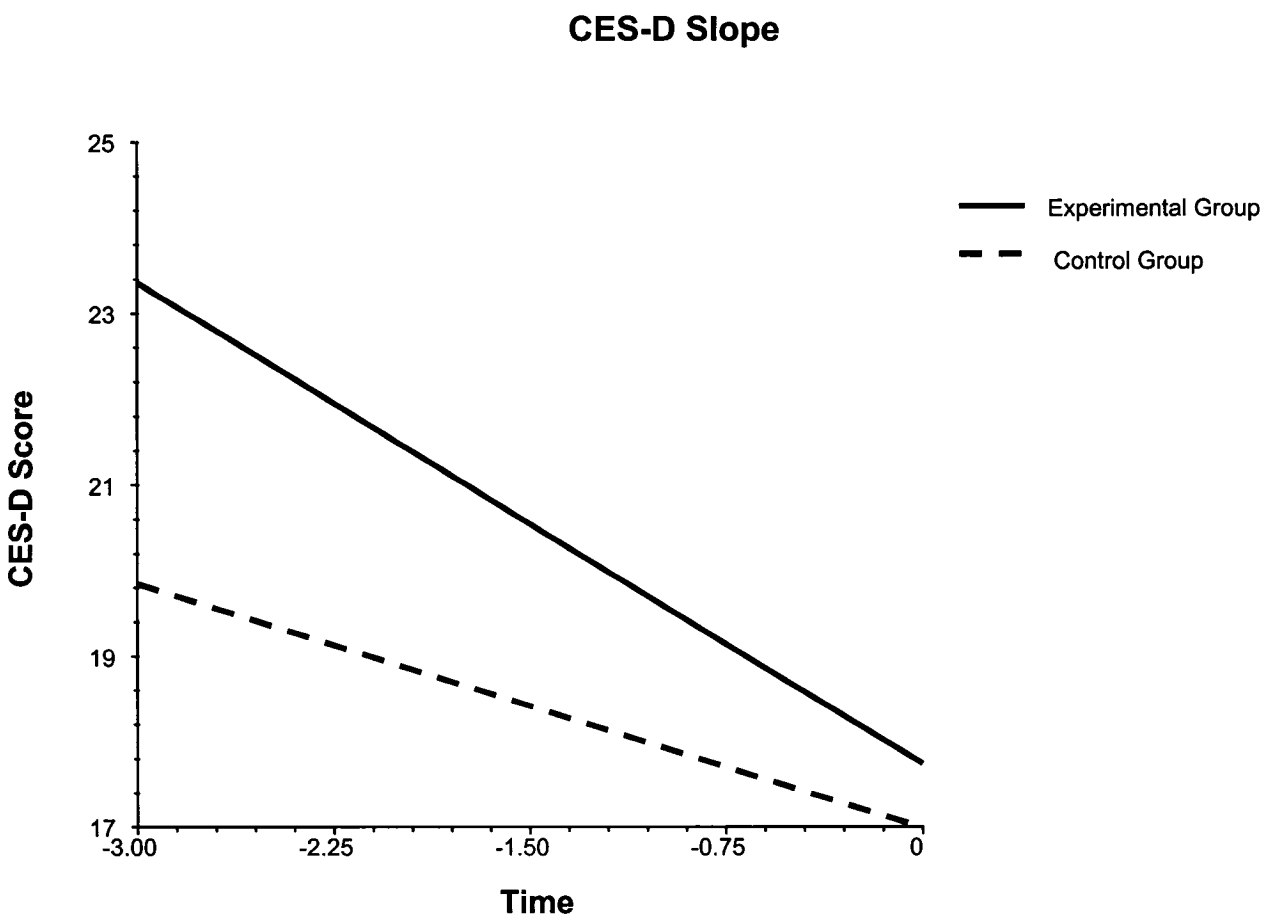


Figure 3. CES-D slopes for experimental (n = 15) and control groups (n = 15).



Appendix A: Writing Instructions

Experimental Group:

Please write a story about your worst fear coming true. Do not worry about grammar, spelling or sentence structure. The important thing is to let yourself go and to write about your deepest thoughts and feelings about the experience. Write in first person, present tense, as if the situation is really happening. Start by describing the circumstances that lead to the situation, then describe what happens during the situation, and finally the consequences of the situation. In other words, tell a story about what happens and how it makes you think and feel. Include your physical sensations. For example, you may wish to describe how your body reacts or what you feel, touch, taste and smell. You may feel anxious when writing thoughts, feelings and sensations about your worst fear—this is normal. Please write about the same feared situation during each writing session. You may change your thoughts, feelings or description but make sure you are writing about the same feared situation every time. The only rule is that once you begin writing, continue to do so until your time is up. I will answer any questions that you may have.

Control Group:

Please write a story about what you would do if you went to work next week and found out that you had the day off. Describe what you would do with your day in an unemotional way. Be as objective as possible about how you would use your time. Do not write about your emotions or reactions, rather describe the day in a factual way. The only rule is that once you begin writing, continue to do so until your time is up. I will answer any questions that you may have.

General Discussion

Theories of Underlying Mechanisms of Exposure

Over the past several decades, evidence has accumulated regarding the efficacy of exposure-based methods in the treatment of anxiety disorders. Nevertheless, there remains considerable debate over the underlying mechanisms of exposure procedures, and different explanations have been proposed to account for the efficacy of exposure in the treatment of anxiety disorders.

Exposure treatments for the anxiety disorders can be traced to conditioning theories that are based on the work of Watson (Watson & Rayner, 1920) and Pavlov (1927), who proposed that pathological anxiety develops through the conditioning of fear. Classical conditioning involves the pairing of a neutral event, referred to as the conditioned stimulus, with an aversive event, known as the unconditioned stimulus. After repeated pairings, the conditioned stimulus comes to signal the unconditioned stimulus, and the mere presentation of the conditioned stimulus elicits anxiety and often motivates escape or avoidance behaviour. Building on the seminal work of Watson and Pavlov, Mowrer (1947) proposed a two-factor theory of fear that suggested that fear emerges via classical conditioning and is maintained through negative reinforcement; namely, through the avoidance of anxiety-provoking stimuli. It can be argued that modern exposure therapies have arisen from Mowrer's theory, as they seek to reduce anxiety through repeated exposure while diminishing avoidance. When applied to excessive worry, this theory suggests that worry is maintained because it reduces uncertainty, thus, individuals with excessive worry are unable to learn that uncertainty is not inherently threatening. Another foundation for exposure in clinical practice can be traced to the habituation

model, according to which decrements in anxiety take place only after a period of prolonged exposure (Lader & Mathews, 1968). An application of the habituation model to clinical practice is the belief that there is an optimal time that one must be exposed to fearful stimuli in order for fear reduction to occur. In addition, some have argued that exposure conducted for short periods of time may in fact augment fear as this can lead to fear sensitization or incubation (e.g. Wilson and O'Leary, 1980).

Whereas conditioning models, such as the two-factor theory and the habituation model, emphasize the process of habituation/extinction and minimize the role of cognitive mediation, more recent accounts consider that learning during exposure is more complex than the weakening of simple associations. For instance, Bandura's social learning model (Bandura, 1986), Beck's cognitive model (Beck & Emery, 1985), and Lang's bioinformational model (Lang, 1977, 1985) emphasize cognitive-mediational constructs in exposure. These theories propose that exposure is a necessary condition for fear reduction change in that it generates opportunities to disconfirm anxious expectations, reappraise fear, and build self-efficacy. Moreover, recent information processing theories incorporate elements of the aforementioned conditioning and cognitive models but emphasize the thought processes during exposure. Information processing theories propose that habituation is necessary as it provides information about the stimulus and situation; however, this information then alters higher level cognitive representations of the feared stimuli, resulting in emotional processing (e.g., Foa & Kozak, 1986; Lang, 1985).

The most widely accepted information processing model of exposure, the emotional processing theory, posits that fear structure modification underlies the efficacy

of exposure in fear reduction (Foa & Kozak, 1986). Rachman (1980) first described emotional processing as a "process whereby emotional disturbances are absorbed, and decline to the extent that other experiences and behaviour can proceed without disruption" (p.51). Rachman argued that fear must be experienced before it can be reduced or eliminated, and he identified the importance of imagery for the successful processing of fear. Foa and Kozak (1986) extended his work by borrowing from Lang's (1977, 1985) bioinformational model that suggests fear networks store memory representations of anxiety provoking events and contain information about stimulus characteristics, verbal and nonverbal response tendencies, feelings, and propositions about the meaning of these events in different situations. Lang posited that it is necessary to process affective images in order to change the cognitive motor structure of fears, because the generation of an affective cognitive structure and its associated physiological reactivity is necessary to achieve extinction and produce behaviour change. Foa and Kozak built on Lang's work by offering an explanation as to *how* fear networks can be modified. As mentioned in the General Introduction, Foa and Kozak suggested that the emotional processing of excessive fear requires the following conditions: (1) exposure to a feared stimulus; (2) full fear network activation, including cognitive, behavioural, affective, and physiological referents; and (3) the incorporation of new corrective information into the fear structure. The incorporation of information that is incompatible with the fear structure is believed to create new affective memories, leading to emotional change and the reduction of fear. Both physiological arousal and subjective anxiety are considered essential for accessing and reorganizing emotional structures, whereas

cognitive avoidance, insufficient duration of exposure, and lack of vividness may impede emotional processing.

Thanks to the research and theorizing on the underlying mechanisms of exposure over the past twenty years, the clinical use of exposure strategies has significantly evolved. However, there remains considerable overlap between the emotional processing and the cognitive and self-efficacy theories of exposure. For example, it remains unclear whether exposure is mediated by cognitive changes that decrease anxiety, or whether a decrease in anxiety makes it less likely that these catastrophic cognitions arise (Rachman, 1993). While the results of the present study reveal that, for nonclinical high worriers performing written exposure, changes in a cognitive process (intolerance of uncertainty) predicted subsequent changes in symptoms, further research on the underlying processes of written exposure is warranted.

Procedural Improvements to Written Exposure and Future Directions

There are potential limitations to our method of written exposure that should be noted in order to improve the procedure for possible use in clinical settings. First and foremost, in contrast to imaginal exposure procedures used in the treatment of GAD, the primary investigator was not involved in the development of the exposure scenario. In standard imaginal exposure procedures, the therapist uses the downward arrow technique to help the client identify his or her core fears. The client is then exposed to the core fear, with the assumption that the emotional processing of the fear will lead to a decrease in worry. A potential weakness of the method used in this study is that there was no discussion or evaluation of the topic of exposure. Because we allowed participants to choose the topic of exposure, there was no way of knowing whether they actually chose

to write about their worst fear or whether they wrote about a lesser, more tolerable fear. In fact, the topics of the exposure scenarios varied a great deal, with some participants writing about the death of family members, whereas others wrote about failing a university examination. This discrepancy in the threat value of the scenarios suggests that some participants exposed themselves to a feared outcome that was not the *core* fear driving the majority of their excessive worrying.

On a similar note, another limitation of our written exposure procedure was that the primary investigator did not contribute to the development of the exposure scenario. For example, the primary investigator did not examine the content of the essays between the writing sessions to gauge whether participants were, in fact, including their cognitive, emotional, and behavioural reactions to the feared outcome. Accordingly, a further improvement to our method of written exposure could be to provide feedback to the participant based on the content of each written scenario. In a similar vein, the application of written exposure to clinical settings may require the therapist to review the essays to ensure that the client includes the necessary components of an imaginal exposure scenario (i.e., present tense, with emotional, cognitive and behavioural reactions and with elements of uncertainty.)

A further possible shortcoming of our written exposure procedure is that it was time-limited. More specifically, participants were restricted to write for 30 minutes on five consecutive days. Imaginal exposure sessions in Dugas and colleagues' treatment for GAD (e.g., Dugas & Ladouceur, 2000; Dugas et al., 2003) last from 30 to 60 minutes, and the duration of the sessions is determined by the length of time it takes for the client's anxiety level to return to the preexposure level (for review, see Dugas & Koerner,

2005). Given that intrasession habituation is deemed to be important for successful emotional processing (Foa & Kozak, 1986), the 30 minute exposure used in the present study may not have been of a sufficient duration for all participants to experience a sufficient decrease in anxiety. On the other hand, given the (modest) positive results of our study, it may be that intrasession habituation is not necessarily required for the reduction in GAD symptoms. Future research should address this issue by examining the role of within-session and between-session habituation in written exposure for worry-related problems.

An additional examination of the mechanisms that contribute to the outcome of written exposure could also enhance our understanding, and the efficacy, of this procedure. For example, although the present study examined the role of intolerance of uncertainty in written exposure, it did not investigate other cognitive processes that may be involved and that may contribute to the success of this procedure. Moreover, we did not include measures of physiological arousal (e.g., heart rate) or subjective activation (e.g., SUDs anxiety ratings) in order to evaluate the role of initial activation and the function of habituation within and between sessions. Our data indicated substantial heterogeneity among the sample; thus, future research could focus on moderators of the written exposure procedure and the study of who benefits most from this procedure. Furthermore, measures of level of experiencing, involvement, and absorption during the writing task may help identify participants who are less able to fully immerse themselves in the exposure. Specifically, if an individual feels that he or she is experiencing the situation as if it is really happening, and feels present, active and involved in the scenario, this should lead to the greater success of exposure. Whereas distraction may have

deleterious effects on the reduction of fear during exposure procedures, experiential involvement may enhance its effects. Written exposure, in contrast to audiotape- or compact disc-assisted exposure, may increase experiencing and involvement because it is a more active and creative approach that "requires one's full attention." In order to improve the written exposure procedure, further understanding of the importance of the above-mentioned mechanisms is required.

To our knowledge, this study is the first to investigate the impact of writing about feared outcomes in a sample of high worriers. Further research is necessary to support our preliminary finding that written exposure leads to decreases in worry, GAD somatic symptoms, and depression in high worriers. In addition, future studies should assess the effects of writing about feared outcomes in clinical populations of excessive worriers and GAD clients. Our findings imply that written exposure has the promise of being applied as a therapeutic intervention, although, as noted above, procedural improvements may be necessary to refine the practice. Future investigations should "fine tune" the intervention for use with clinical populations suffering from pathological worry and worry-related problems.

Although significant progress has been made in the conceptualization and treatment of worry and GAD, further research must continue to advance our knowledge in this field. As mentioned previously, the diffuse nature of GAD fears makes the use of exposure interventions considerably challenging with individuals suffering from this anxiety disorder. In order to improve current exposure interventions for GAD, additional research on the relationship between information processing biases and intolerance of uncertainty in individuals with GAD is needed. In addition, exposure for GAD could be

enhanced with more information on GAD client's specific appraisals of feared events and the study of how these appraisals may be modified during exposure. The results of the present study support the use of written exposure to target intolerance of uncertainty, and ultimately decrease worry, GAD somatic symptoms, and depression. Future research should focus on developing our understanding of the combined contributions of intolerance of uncertainty and cognitive avoidance in GAD, and the role of cognitive, behavioural and emotional avoidance in the inhibition of complete emotional processing.

References

American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: Author.

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: Author.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4rd ed.). Washington, DC: Author.

Bandura, A. (1986). Fearful expectations and avoidant actions as coeffects of perceived self-inefficacy. *American Psychologist, 41*, 1389-1391

Beck, A. T., & Emery, G. (1985). *Anxiety disorders and phobias: A cognitive perspective*. New York: Basic Books.

Blazer, D. G., Hughes, D., George, L. K., Swartz, M., & Boyer, R. (1991). Generalized anxiety disorder. In: Robins L.N., Regier, D.A., eds. *Psychiatric disorders in America: the Epidemiologic Catchment Area Study* (pp. 180-203). New York: Free Press.

Bootzin, R. R. (1997). Examining the theory and clinical utility of writing about emotional experiences. *Psychological Science, 8*, 167-169.

Borkovec, T. D., Alcaine, O., & Behar, E. (2004). Avoidance theory of worry and generalized anxiety disorder. In R. G. Heimberg, C. L. Turk, & D. S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice,* pp. 77-108. New York: Guilford Press.

Borkovec, T. D. & Costello, E. (1993). Efficacy of applied relaxation and cognitive-behavioral therapy in the treatment of generalized anxiety disorder. *Journal of Consulting and Clinical Psychology, 61,* 611-619.

Borkovec, T. D. & Inz, J. (1990). The nature of worry in generalized anxiety disorder: A predominance of thought activity. *Behaviour Research and Therapy, 28*, 69-73.

Borkovec, T. D., & Hu, S. (1990). The effect of worry on cardiovascular response to phobic imagery. *Behaviour Research and Therapy, 28,* 69-73.

Borkovec, T. D., Newman, M. G., Pincus, A. L., & Lytle, R. (2002). A component analysis of cognitive-behavioural therapy for generalized anxiety disorder and the role of interpersonal problems. *Journal of Consulting and Clinical Psychology, 70*, 288-298.

Borkovec, T. D., Wilkinson, L., Folensbee, R., & Lerman, C. (1983). Stimulus control applications to the treatment of worry. *Behaviour Research and Therapy, 21*, 247-251.

Bouton, M. E., & Bolles, R. C. (1979). Role of conditioned contextual stimuli in reinstatement of extinguished fear. *Journal of Experimental Psychology: Animal Behavior Processes*, 5, 368–378.

Bouton, M. E., & Swartzentruber, D. (1991). Sources of relapse after extinction in Pavlovian and instrumental learning. *Clinical Psychology Review, 11*, 123–140.

Buhr, K., & Dugas, M. J. (2002). The Intolerance of Uncertainty Scale: Psychometric properties of the English version. *Behaviour Research and Therapy, 40,* 931–945.

Butler, G., Wells, A., & Dewick, H. (1995) Differential effects of worry and imagery after exposure to a stressful stimulus: A pilot study. *Behavioural and Cognitive Psychotherapy, 23*, 45-56.

Carter, R. M, & Maddock, R. J. (1992). Chest pain in generalized anxiety disorder. *International Journal of Psychiatry Medicine, 22*, 291-298.

Carter, R. M, Wittchen, H. U, Pfister, H., & Kessler, R.C. (2001). One-year prevalence of subthreshold and threshold DSM-IV generalized anxiety disorder in a nationally representative sample. *Depression and Anxiety, 13*, 78-88.

Choquette, K. A. & Hesselbrock, M. N. (1987). Effects of retesting with the Beck and Zung depression scales in alcoholics. *Alcohol and Alcoholism, 22*, 217-283.

Craske, M. J. (1999). Anxiety disorders: *Psychological approaches to theory and treatment.* Boulder, CO: Westview Press.

Craske, M. J., Barlow, D. H., & O'Leary, T. (1992). *Mastery of your anxiety and worry.* Albany, NY: Graywind.

Dugas, M. J., Freeston, M. H., Provencher, M. D., Lachance, S., Ladouceur, R., & Gosselin, P. (2001). Le Questionnaire sur l'Inquietude et l'Anxiete: Validation dans des echantillons non cliniques et cliniques [The Worry and Anxiety Questionnaire: Validation in nonclinical and clinical samples]. *Journal de Therapie Comportementale et Cognitive, 11,* 31–36.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*, 215-226.

Dugas, M. J., Gosselin, P., & Ladouceur, R. (2001). Intolerance of uncertainty and worry: Investigating specificity in a nonclinical sample. *Cognitive Therapy and Research, 25*, 551-558.

Dugas, M. J., & Koerner, N. (2005). Cognitive-behavioural treatment for generalized anxiety disorder: Current status and future directions. *Journal of Cognitive Psychotherapy: An International Quarterly, 19,* 61-81.

Dugas, M. J., Ladouceur, R., Léger, E., Freeston, M. H., Langlois, F., Provencher, M. D., et al., (2003). Group cognitive-behavioral therapy for generalized anxiety disorder: Treatment outcome and long-term follow-up. *Journal of Consulting and Clinical Psychology, 71*, 821–825.

Dugas, M. J., & Ladouceur, R. (2000). Treatment of GAD: Targeting intolerance of uncertainty in two types of worry. *Behavior Modification, 24*(5), 635-657.

Dugas, M. J., Langlois, F., Rhéaume, J., & Ladouceur, R. (1998, November). *Intolerance of uncertainty and worry: Investigating causality*. In J. Stoeber (chair), Worry: New findings in applied and clinical research. Symposium: Association for Advancement of Behavior Therapy, Washington, DC.

Dugas M. J., Marchand A, Ladouceur R. (2005). Further validation of a cognitive-behavioral model of generalized anxiety disorder: Diagnostic and symptom specificity. *Journal of Anxiety Disorders, 19*, 329-343

Dugas, M. J., & Robichaud, M. (in press). *Cognitive-behavioral treatment for generalized anxiety disorder: From science to practice.* New York: Routledge.

Foa, E. B., & Kozak, M. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin, 99*, 20-35.

Foa, E. B, & Rothbaum, B.O. (1998). *Treating the Trauma of Rape: Cognitive-Behavioral Therapy for PTSD.* Guilford Press, Guilford Press.

Francis, K., Dugas, M. J., & Bouchard, S. (2004, November). *Investigating Change in Worry And Anxiety During Cognitive-Behavioural Therapy and Applied Relaxation for Generalized Anxiety Disorder.* Poster session presented at the Annual Convention for the Association for Advancement of Behavior Therapy, New Orleans, LA.

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17,* 791–802.

Gillis, M. M., Haaga, D. A. F., & Ford, G. T. (1995). Normative values for the Beck Anxiety Inventory, Fear Questionnaire, Penn State Worry Questionnaire, and Social Phobia and Anxiety Inventory. *Psychological Assessment, 7,* 450-455.

Heinecke, N., Koerner, N., Dugas, M. J., & Mogg, K. (2006, July). *The relation between intolerance of uncertainty and attentional biases.* Poster presented at the annual convention of the British Association for Behavioural and Cognitive Psychotherapies, Warwick, United Kingdom.

Hoyer, V. J., Krause, P., Höfler, M., Beesdo, K., & Wittchen, H. U. (2001). Recognition of generalized anxiety disorder and depression and its predictors in primary care. *MMW Fortschritte der Medizin, 143,* 26-35.

Judd, L. L., Kessler, R. C., Paulus, M. P., Zeller, P. V., Wittchen, H. U., & Kunovac, J. L. (1998). Comorbidity as a fundamental feature of generalized anxiety disorders: results form the National Comorbidity Study (NCS). *Acta Psychiatrica Scandinavica, 393,* 6-11.

Kessler, R. C., DuPont, R. L., Berglund, P., & Wittchen, H. U. (1999). Impairment in pure and comorbid generalized anxiety disorder and major depression at 12 months in two national surveys. *American Journal of Psychiatry, 156*, 1915-1923.

Kloss, J. D., & Lisman, S. A., (2002). An exposure-based examination of the effects of written emotional disclosure. *British Journal of Health and Psychology, 7*, 31-46.

Koerner, N. & Dugas, M. J. (2006). A cognitive model of generalized anxiety disorder: The role of intolerance of uncertainty. In G.C.L. Davey and A. Wells (Eds.) *Worry and Its Psychological Disorders: Theory, Assessment and Treatment.* England: John Wiley & Sons.

Lader, M. H., & Mathews, A. M. (1968). A physiological model of phobic anxiety and desensitization. *Behaviour Research and Therapy, 6, 411*-421.

Ladouceur, R., Dugas, M. J., Freeston, M. H., Léger, E., Gagnon, F., & Thibodeau, N. (2000). Efficacy of a cognitive-behavioral treatment for generalized anxiety disorder: Evaluation in a controlled clinical trial. *Journal of Consulting and Clinical Psychology, 68*, 957-964.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: A study of a theoretical model of worry. *Behavior Research and Therapy, 38,* 933-941.

Lang, P. J. (1977). Imagery and therapy. *Behavior Therapy 8*, 862-886.

Lang, P. J. (1985). The cognitive psychophysiology of emotion: Fear and anxiety. In A. Tuma & J. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 131-170). Hillsdale, NJ: Lawrence Erlbaum associates.

Lydiard, R. B., Fossey, M. D., Marsh, W., & Ballenger, J. C. (1993). Prevalence of psychiatric disorders in patients with irritable bowel syndrome. *Psychosomatics, 34*, 229–234.

Mathews, A. (1993). Attention and memory for threat in anxiety. In H. W. Krohne (Ed.), *Attention and avoidance: Strategies in coping with aversiveness* (pp. 119-135). Kirkland, WA: Hogrefe & Huber.

Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2005). Preliminary evidence for an emotion regulation deficit model of generalized anxiety disorder. *Behaviour Research and Therapy, 43*, 1281-1310.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28,* 487–496.

Mineka, S., Mystkowski, J. L., Hladek, D., & Rodriguez, B. I. (1999). The effects of changing contexts on return of fear following exposure therapy for spider fear. *Journal of Consulting and Clinical Psychology, 67*, 599–604.

Molina, S., & Borkovec, T. D. (1994). The Penn state worry questionnaire: psychometric properties and associated characteristics. In G. C. L. Davey, & F. Tallis (Eds.), *Worrying: Perspectives on theory, assessment and treatment* (pp. 265–283). Chichester, England: Wiley.

Mowrer, O. H. (1947). On the dual nature of learning: A re-interpretation of "conditioning" and "problem-solving." *Harvard Educational Review, 17*, 102-148.

Noyes, R. Jr. (2001). Comorbidity in generalized anxiety disorder. *The Psychiatric Clinics of North America, 24*, 41-55.

Park, C. L., & Blumberg, C. J. (2002). Disclosing trauma through writing: Testing the meaning-making hypothesis. *Cognitive Therapy and Research, 26*, 597-616.

Pavlov, I. P. (1927). *Conditioned Reflexes* translated by G V Anrep. London, England: Oxford University Press.

Pennebaker, J. W. (1989). Cognition, inhibition, and disease. In L. Berkowitz (Ed.) *Advances in experimental social psychology* (Vol.22, pp. 211-244). New York: Academic Press.

Pennebaker, J. W., & Beall, S. K. (1986). Confronting a traumatic event: Toward an understanding of inhibition and disease. *Journal of Abnormal Psychology, 95*, 274-281.

Rachman, S. J. (1979). The return of fear. *Behaviour Research and Therapy, 17*, 164–165.

Rachman, S. (1980). Emotional Processing. *Behavior Research and Therapy, 18*, 51-60.

Rachman, S. (1993). Obsessions, responsibility and guilt. *Behaviour Research and Therapy, 31*, 149–154.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401.

Raudenbush, S. W., & Bryk, A. S. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods*. 2 ed. Thousand Oaks, California: Sage Publications.

Schmidt, R. A., & Bjork, R. A. (1992). New conceptualization of practice: Common principles in three paradigms suggest new concepts for training. *Psychological Science, 3,* 207-217.

Sharpe, J. P., & Gilbert, D. G. (1998). Effects of repeated administration of the Beck Depression Inventory and other measures of negative mood states. *Journal of Personality and Individual Differences, 24,* 457-463.

Sloan, D. M., & Marx, B. P. (2004a). A closer examination of the structured written disclosure procedure. *Journal of Consulting and Clinical Psychology, 4*, 165-175.

Sloan, D. M., & Marx, B. P. (2004b). Examining theories underlying the structured written disclosure written disclosure paradigm. *Clinical Psychology: Science and Practice, 11,* 121-137.

Sloan, D. M., Marx, B. P., & Epstein, E. V. (2005). Further examination of the exposure model underlying the efficacy of written emotional disclosure. *Journal of Consulting and Clinical Psychology, 73,* 549-554.

Smyth, J. M. (1998). Written emotional expression: Effect sizes, outcome types, and moderating variables. *Journal of Consulting and Clinical Psychology, 66,* 174-184.

Smyth, J. M., True, N., & Souto, J. (2001). Effects of writing about traumatic experiences: The necessity for narrative structuring. *Journal of Social and Clinical Psychology, 20,* 161-172.

Southworth, S., & Kirsch, I. (1988). The role of expectancy in exposure-generated fear reduction in agoraphobia. *Behaviour Research and Therapy, 26,* 113-120.

Stöber, J., & Bittencourt, J. (1998). Weekly assessment of worry: An adaptation of the Penn State Worry Questionnaire for monitoring changes during treatment. *Behaviour Research and Therapy 36,* 645-656.

Watson, J. B. & Raynor, R. (1920). Conditioned emotional reactions. *Journal of Experimental Psychology, 3,* 1-14.

Wells, A. & King, P. (2006). Metacognitive therapy for generalized anxiety disorder: An open trial. *Journal of Behavior Therapy and Experimental Psychiatry, 37,* 206–212.

Wilson, G. T., & O'Leary, K. D. (1980). *Principles of behavior therapy.* New Jersey: Prentice-Hall.

Wittchen, H. U. (2002). Generalized anxiety disorder: prevalence, burden, and cost to society. *Depression and Anxiety, 16,* 162-171.

Wittchen, H. U., Kessler, R. C., Beeselo, K., Krause, P., Höfler, M., & Hoyer, P. (2002). Generalized anxiety and depression in primary care: Prevalence, recognition and management. *Journal of Clinical Psychology, 63,* 24-34.

Wittchen, H. U., Carter, R. M, Pfister, H., Montgomery, S. A., & Kessler, R.C. (2000). Disabilities and quality of life in pure and comorbid generalized anxiety disorder and major depression in a national survey. *International Clinical Psychopharmacology, 15,* 319-328.

Wittchen, H. U., Krause, P., Hoyer, J., Beesdo, K., Jacobi, F., Höfler, M., & Winter, S. (2001). Prevalence and correlates of GAD in primary care. *MMW Fortschritte der Medizin, 143,* 17-25.

Wittchen, H. U., Zhao, S., Kessler, R. C., & Eaton, W. W. (1994). DSM-III-R generalized anxiety disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 51,* 353-364.

Appendix A: Phone Screening Interview

Participant: _____ Interviewer: _____ Date: _____

AGE: _____

Medication

1. Are you currently taking any medication? If yes, what medication?

_____

If participant is taking any psychotropic medication or cardiovascular medication, exclude from study.

Heart Disease

2. Do you have a heart condition or heart disease? _____

If yes, exclude from study.

Psychotherapy

3. Are you currently receiving medical treatment or any type of therapy?_____

If yes, exclude from study.

GAD

1. Which topics do you generally worry about?

		GAD	Non-GAD
a)	_____	_____	_____
b)	_____	_____	_____
c)	_____	_____	_____
d)	_____	_____	_____

If the participant describes worries concerning his/her physical health, investigate the presence of a medical problem. If there is such a problem, evaluate if the worries are excessive for the individual's physical health. To evaluate whether the worries are excessive for a medical problem, you must consider:

(1) The severity of the medical problem
(2) The duration since the onset of the medical problem

(3) The frequency of the worries
(4)The intensity of the worries

Continue with the evaluation, excluding worries that are typical of someone with a medical condition and those that are associated with another emotional problem. For example, do not include worries of the following topics:

(1) Panic attacks
(2) Evaluation of others in a social situation
(3) An obsession or compulsion
(4) A simple phobia
(5) A depression
(6) Any other psychological problem

2. Do your worries seem excessive or exaggerated to you?

Yes _____ No _____

3. Does anyone close to you say that your worries are excessive or exaggerated?

Yes _____ No _____

If yes:

Who? a) _____

b) _____

4. Do you have trouble controlling your worries? For example, once you start to worry, do you have difficulty stopping?

Yes _____ No _____

If the participant says no, determine whether his/her worries remain even when he/she does not want to worry. If yes, then he/she has difficulty controlling his/her worries.

5. On a typical day during the last month, what percentage of the day have you felt tense, anxious or worried? _____%

This question refers to a 16-hour day; in other words, the total hours spent awake. Therefore, if the individual worries for four hours, the percentage would be 25%.

6. Once you stop worrying, how long does it take before your worries return?

min _____ max _____

7. Recently, have you been bothered by your worries for more than one out of two days?

Yes _____ No _____

"Recently" is referring to "during the last few months". If the participant has difficulty responding, you can ask if he/she is worried or anxious on a usual day or if he/she is on average worried or anxious.

If yes: For how long? _____

8. For how long have your worries or your anxiety been a problem for you?

____Years____months

This is not a question evaluating the duration of worries that are present for more than one day out of two, but rather is a question of how long these worries have been a problem for the person.

9. During the past six months, have you been bothered by one or more of the following sensations?

Agitated, over-excited or feeling "on-edge"	Yes _____	No _____
Easily fatigued	Yes _____	No _____
Difficulty concentrating or mind going blank	Yes _____	No _____
Muscular tension	Yes _____	No _____
Difficulty sleeping	Yes _____	No _____
Irritability	Yes _____	No _____

If the person endorses at least 3 symptoms, he/she meets the somatic criteria.

Does he/she meet the somatic criteria?

Yes _____ No _____

10. Do your worries or anxiety interfere with your life (your work, social activities, family, etc)?

Yes _____ No _____

11. Do your worries or anxiety cause you to avoid certain activities?

Yes _____ No _____

12. Do your worries or anxiety cause you to do certain things that you normally would not do?

Yes _____ No _____

13. Do your worries or anxiety cause you to feel bad during an activity or while relaxing?

Yes _____ No _____

If the person endorses at least one of the above questions, he/she meets the interference criteria.

Does he/she meet the interference criteria?

Yes _____ No _____

14. Apart from the symptoms already discussed (worry and anxiety), are there any other psychological problems that you would get counselling for?

Yes _____ No _____

If yes, which ones?

15. Which of the following is most bothersome: (1) your worries and anxiety (2) the other psychological problem?

GAD _____% Other _____%

Major Depression

1. INITIAL INQUIRY

1.a. Currently, have you been feeling depressed, sad, empty or have you lost interest or pleasure in almost all of your usual activities?

Depressed: YES_____ NO_____

Loss of interest YES_____ NO_____

b. Currently, have other people commented to you that you appear down or tearful or that you seem less interested in your usual activities?

Depressed:

YES_____NO_____

Loss of interest

YES_____NO_____

If **NO** to 1a and 1b **stop**

If **YES** to either 1a or 1b skip to **CURRENT EPISODE**.

2. CURRENT EPISODE

Now I want to ask you a series of questions about this current period of time when you felt depressed/loss of interest.

1. Have you been experiencing the feelings of [depression/loss of interest in usual activities] nearly every day over the past two weeks?

Depressed: YES_____NO_____
Loss of interest: YES_____NO_____

2. Over the past 2 weeks, have you experienced_____?; Have you experienced _____ nearly every day over the past 2 weeks? (Record symptoms that have been present during the same two-week period and represent a change from previous functioning).

0-----1-------2-------3-------4-------5-------6------7-------8
None Mild Moderate Severe Very Severe

		Severity	Nearly every day
a.	significant weight loss or weight gain (e.g. 5% of body weight within a month); decrease or increase in appetite		Y N
b.	Insomnia or hypersomnia		Y N
c.	*Psychomotor agitation or retardation.* Unable to sit still or so slowed down that you can hardly move or carry on a conversation? (must be observable)		Y N
d.	Loss of energy or fatigue		Y N
e.	Worthlessness or excessive, inappropriate guilt.. Do you blame yourself for anything or feel guilty?		Y N
f.	Impaired concentration, slowed thinking, or indecisiveness. Thinking been slowed down, hard to make decisions?		Y N
g.	Recurrent thoughts of death or suicide. Think about death or hurting yourself? How much do you think about it?		Y N

If yes to 2g, inquire about the extent of suicidal ideation or intent (e.g. history of prior attempts, presence/extent of current plan, access to method for carrying out plan, ability to state reasons for living):

_____

_____

_____

_____

3. In what ways have these symptoms of depression interfered with your life (e.g. daily routine, job, social activities)? How much are you bothered about having these symptoms?

Are you seeking treatment for your worry or anxiety? Are you looking for help?

If treatment seeking, explain that this is not a treatment study, give information on resources available, etc.

Appendix B: Penn State Worry Questionnaire (PSWQ)

PSWQ

Please circle a number (1 to 5) that best describes how typical or characteristic each item is of you.

	Not at all typical		Somewhat typical		Very Typical
1. If I don't have enough time to do everything, I don't worry about it .	1	2	3	4	5
2. My worries overwhelm me.	1	2	3	4	5
3. I don't tend to worry about things.	1	2	3	4	5
4. Many situations make me worry.	1	2	3	4	5
5. I know I shouldn't worry about things but I just can't help it.	1	2	3	4	5
6. When I'm under pressure, I worry a lot.	1	2	3	4	5
7. I am always worrying about something.	1	2	3	4	5
8. I find it easy to dismiss worrisome thoughts.	1	2	3	4	5
9. As soon as I finish one task, I start to worry about everything else I have to do.	1	2	3	4	5
10. I never worry about anything.	1	2	3	4	5
11. When there is nothing more that I can do about a concern, I don't worry about it anymore.	1	2	3	4	5
12. I've been a worrier all my life.	1	2	3	4	5
13. I notice that I have been worrying about things.	1	2	3	4	5
14. Once I start worrying, I can't stop.	1	2	3	4	5
15. I worry all the time.	1	2	3	4	5
16. I worry about projects until they are all done.	1	2	3	4	5

Meyer, T. J. , Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990).

Appendix C: Writing Instructions

EXPERIMENTAL GROUP:

Please write a story about your worst fear coming true. Do not worry about grammar, spelling or sentence structure. The important thing is to let yourself go and to write about your deepest thoughts and feelings about the experience. Write in first person, present tense, as if the situation is really happening. Start by describing the circumstances that lead to the situation, then describe what happens during the situation, and finally the consequences of the situation. In other words, tell a story about what happens and how it makes you think and feel. Include your physical sensations. For example, you may wish to describe how your body reacts or what you feel, touch, taste and smell. You may feel anxious when writing thoughts, feelings and sensations about your worst fear—this is normal. Please write about the same feared situation during each writing session. You may change your thoughts, feelings or description but make sure to write about the same feared situation every time. The only rule is that once you begin writing, continue to do so until your time is up. I will answer any questions that you may have.

CONTROL GROUP:

Please write a story about what you would do if you went to work next week and found out that you had the day off. Describe what you would do with your day in an unemotional way. Be as objective as possible about how you would use your time. Do not write about your emotions or reactions, rather describe the day in a factual way. The only rule is that once you begin writing, continue to do so until your time is up. I will answer any questions that you may have.

Appendix D: Penn State Worry Questionnaire Past Week

PSWQ-PW

Please circle a number (1 to 5) that best describes how typical or characteristic each item was of you **in the past week.**

	Not at all typical		Somewhat typical		Very Typical
1. If I didn't have enough time to do everything, I didn't worry about it .	1	2	3	4	5
2. My worries overwhelmed me.	1	2	3	4	5
3. I didn't tend to worry about things.	1	2	3	4	5
4. Many situations made me worry.	1	2	3	4	5
5. I knew I shouldn't have worried about things but I just couldn't help it.	1	2	3	4	5
6. When I was under pressure, I worried a lot.	1	2	3	4	5
7. I was always worrying about someth	1	2	3	4	5
8. I found it easy to dismiss worrisome thoughts.	1	2	3	4	5
9. As soon as I finished one task, I started worrying about everything else I hac	1	2	3	4	5
10. I never worried about anything.	1	2	3	4	5
11. When there was nothing more that I could do about a concern, I didn't worry about it anymore.	1	2	3	4	5
12. I noticed that I had been worrying about things	1	2	3	4	5
13. Once I started worrying, I couldn't s	1	2	3	4	5
14. I worried all the time.	1	2	3	4	5
15. I worried about projects until they were all done.	1	2	3	4	5

Meyer, T. J. , Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990).

Appendix E: Worry and Anxiety Questionnaire Past Week

WAQ-PW

For the following items, please circle the corresponding number (1 to 8).

1. In the past week, did your worries seem excessive or exaggerated?

Not at all excessive			Moderately excessive				Totally excessive
0	1	2	3	4	5	6	7	8

2. In the past week, how many days have you been bothered by excessive worry?

Never			1 day out of 2				Everyday
0	1	2	3	4	5	6	7	8

3. In the past week, did you have difficulty controlling your worries? For example, when you started worrying about something, did you have difficulty stopping?

No difficulty			Moderate difficulty				Extreme difficulty
0	1	2	3	4	5	6	7	8

4. In the past week, to what extent have you been disturbed by the following sensations when you were worried or anxious? Rate each sensation by circling a number (1 to 8).

a) Restlessness or feeling keyed up or on edge.

Not at all			Moderately				Very severely
0	1	2	3	4	5	6	7	8

b) Being easily fatigued.

Not at all			Moderately				Very severely
0	1	2	3	4	5	6	7	8

c) Difficulty concentrating or mind going blank.

Not at all			Moderately				Very severely
0	1	2	3	4	5	6	7	8

d) Irritability.

Not at all			Moderately				Very severely
0	1	2	3	4	5	6	7	8

e) Muscle tension.

Not at all Moderately Very severely

.....0..... .....1..... .....2.....3.....4.....5.....6.....7.....8.....

f) Sleep disturbance (difficulty falling or staying asleep, or restless unsatisfying sleep).

Not at all Moderately Very severely

.....0..... .....1..... .....2.....3.....4.....5.....6.....7.....8.....

---

5. In the past week, to what extent did worry or anxiety interfere with your life? For example, your work, social activities, family life, etc.?

Not at all Moderately Very severely

.....0..... .....1..... .....2.....3.....4.....5.....6.....7.....8.....

Dugas, M.J., Freeston, M. H., Lachance, S., Provencher, M., & Ladouceur, R. (1995, November). The worry and anxiety questionnaire: clinical validation in non-clinical and clinical samples. World Congress of Behavioural and Cognitive Therapies, Copenhagen, Denmark.

Appendix F: Center for Epidemiologic Studies Depression Scale

CES-D

Below is a list of the ways you might have felt or behaved. Please read each statement carefully and, using the scale below, circle a number (0 to 3) to indicate how often you have felt this way **during the past week.**

	Rarely or none of the time (Less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of the time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor.	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends.	0	1	2	3
4. I felt that I was just as good as other people.	0	1	2	3
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future	0	1	2	3
9. I thought my life has been a fa	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3

	Rarely or none of the time (Less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of the time (3-4 days)	Most or all of the time (5-7 days)
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not get going.	0	1	2	3

Randloff, L.S. (1977).

Appendix G: Intolerance of Uncertainty Scale

IUS

You will find below a series of statements which describe how people may react to the uncertainties of life. Please use the scale below to describe to what extent each item is characteristic of you. Please circle a number (1 to 5) that describes you best.

	Not at all characteristic of me			Somewhat characteristic of me		Entirely characteristic of me
1. Uncertainty stops me from having a firm opinion.	1	2	3	4	5	
2. Being uncertain means that a person is disorganized.	1	2	3	4	5	
3. Uncertainty makes life intolerable.	1	2	3	4	5	
4. It's unfair not having any guarantees in life.	1	2	3	4	5	
5. My mind can't be relaxed if I don't know what will happen tomorrow.	1	2	3	4	5	
6. Uncertainty makes me uneasy, anxious, or stressed.	1	2	3	4	5	
7. Unforeseen events upset me greatly.	1	2	3	4	5	
8. It frustrates me not having all the information I need.	1	2	3	4	5	
9. Uncertainty keeps me from living a full life.	1	2	3	4	5	
10. One should always look ahead so as to avoid surprises.	1	2	3	4	5	
11. A small unforeseen event can spoil everything, even with the best of planning.	1	2	3	4	5	

	Not at all characteristic of me			Somewhat characteristic of me			Entirely characteristic of me
12. When it's time to act, uncertainty paralyses me.	1		2		3		4		5
13. Being uncertain means that I am not first rate.	1		2		3		4		5
14. When I am uncertain, I can't go forward.	1		2		3		4		5
15. When I am uncertain I can't function very well.	1		2		3		4		5
16. Unlike me, others always seem to know where they are going with their lives.	1		2		3		4		5
17. Uncertainty makes me vulnerable, unhappy, or sad.	1		2		3		4		5
18. I always want to know what the future has in store for me.	1		2		3		4		5
19. I can't stand being taken by surprise.	1		2		3		4		5
20. The smallest doubt can stop me from acting.	1		2		3		4		5
21. I should be able to organize everything in advance.	1		2		3		4		5
22. Being uncertain means that I lack confidence.	1		2		3		4		5
23. I think it's unfair that other people seem sure about their future.	1		2		3		4		5
24. Uncertainty keeps me from sleeping soundly.	1		2		3		4		5

	Not at all characteristic of me			Somewhat characteristic of me			Entirely characteristic of me
25. I must get away from all uncertain situations.	1		2		3		4		5
26. The ambiguities in life stress me	1		2		3		4		5
27. I can't stand being undecided about my future.	1		2		3		4		5

Origianl French Version: Freeston, M.H., Rhéaume, J., Letarte, H., Dugas, M.J., & Ladouceur, R. (1994): Why do people worry? *Personality and Individual Differences, 17* (6), 791-802.

English Version: Buhr, K., Dugas, M. J. (2002). The intolerance of uncertainty scale: psychometric properties of the English version. *Behavior Research and Therapy, 40*, 931-945.