A preliminary test of the therapeutic potential of written exposure with rescripting for generalized anxiety disorder

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Abstract
This experiment tested a novel written exposure intervention for generalized anxiety disorder (GAD) that consisted of guided rescripting of participants’ worst fear. After describing their worst fear, adults with GAD (N = 79) were randomly assigned to one of three writing interventions, each consisting of three sessions on consecutive days: (1) standard written exposure (WE), (2) written exposure with rescripting (RWE), and (3) neutral control writing (NC). Measures of symptoms and worry-associated processes were administered at pre- and post-intervention, and at 1-week and 1-month follow-ups. Worry declined significantly in all three conditions. Participants in WE reported significant reductions in fear of anxiety, whereas those in RWE reported significant reductions in fear of anger. Participants in RWE and NC reported a significant decrease in fear of positive emotion. Following RWE, participants perceived their feared scenario as less costly and perceived themselves as better able to cope with it, whereas participants in the WE and NC did not show these changes. Cognitive avoidance, intolerance of uncertainty, and negative problem orientation did not change. Findings suggest overall, RWE was not superior to WE, and that more research is needed to assess their therapeutic potential. Strengths and limitations are discussed for the benefit of future research on exposure for GAD.

Keywords
Exposure, generalized anxiety disorder, imagery rescripting, worry, written exposure

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Introduction
Generalized anxiety disorder (GAD) is a chronic, difficult-to-treat condition characterized by excessive and uncontrollable worry about negative events in key domains of life, for example, work, school, relationships, health, finances (American Psychiatric Association, 2013). A number of models have contributed to our theoretical and clinical understanding of worry, and the cognitive and affective processes that give rise to and maintain chronic worry (see Behar, DiMarco, Hekler, Mohlman, & Staples, 2009, for a review). What is clear across theories is that avoidance is a major feature of GAD; three theories, in particular, informed the current research.

Borkovec, Alcaine, and Behar’s’ (2004) seminal avoidance theory of worry suggested that the verbal quality of worry functions to dampen images of feared catastrophes, and the aversive emotional arousal that accompanies these images; in this model, worry is viewed as a form of cognitive avoidance. Subsequent theories of GAD have elaborated on the avoidant function of worry. Dugas and colleagues (1998) incorporated Borkovec’s notion of cognitive avoidance and suggested as well that individuals with GAD engage in efforts to control or avoid the uncertainty that is inherent in problems, regardless of whether those problems are actual or hypothetical. Intolerance of uncertainty reflects negative beliefs about uncertainty and the implications of being uncertain (Dugas & Robichaud, 2007, p. 24) and contributes to chronic worry and uncertainty-controlling behaviors, as does a negative problem orientation—a set of dysfunctional beliefs reflecting a lack of confidence in problem-solving ability and appraisals of problems as threats (Dugas et al., 1998; Koerner & Dugas, 2006; Robichaud & Dugas, 2005). Mennin, Turk, Heimberg, and Carmin (2004) expanded on the emotion component of Borkovec’s cognitive avoidance concept by proposing that individuals with GAD fear strong emotions, and that worry enables short-term emotional avoidance but further dysregulates emotion (Mennin, Turk, Heimberg, & Carmin, 2004; Mennin, Heimberg, Turk, & Fresco, 2005).

Although the processes thought to underlie and maintain GAD appear on the surface to differ across these theories of GAD, all three theories share an emphasis on avoidance of internal experiences: imagery of frightening situations, uncertainty, and intense emotions, respectively. Accordingly, all cognitive-behavioral treatments for GAD include strategies to counteract avoidance and assume that a reduction in avoidance is important for new learning to occur (e.g., change in dysfunctional or unhelpful beliefs).

Imaginal exposure for GAD
A key component of several cognitive-behavioral therapy (CBT) protocols for GAD is imaginal exposure (Borkovec & Costello, 1993; Craske & Barlow, 2006; Dugas & Robichaud, 2007; Mennin, 2004). Protocols vary somewhat, but generally individuals are instructed to conjure up a detailed, vivid mental image of their worst-case scenario from a first-person, present-tense perspective. The main goal of this form of exposure is to help individuals counteract their avoidance by having them repeatedly imagine and process concrete and vivid images of their worst fear coming true and sit with those images instead of using worry or other avoidance strategies to reduce their emotional response (Dugas & Koerner, 2005). Some protocols include a cognitive restructuring component that involves generating alternative outcomes after holding the image of the feared situation in mind for an extended time (Craske & Barlow, 2006), and some recommend repeated listening of a recorded narrative of the worst fear (e.g., Dugas & Robichaud, 2007). The efficacy of imaginal exposure for GAD has been examined independently of other CBT techniques in only a few studies (Hoyer et al., 2009; Provencher, Dugas, & Ladouceur, 2004). Findings from these studies suggest that twelve to fifteen 1-hr sessions of imaginal exposure are associated with large improvements in worry and GAD-associated symptoms (ds = 0.73–1.63).

While the few studies examining imaginal exposure as a standalone treatment for GAD are encouraging, little is known about how best to conduct the procedure, and it continues to be partly patterned on procedures for prolonged exposure for trauma (e.g., Foa, Hembree, & Rothbaum, 2007). However, aside from Borkovec’s (1994) early theorizing of worry as cognitive avoidance of feared hypothetical situations, there seems to be no clear rationale underpinning the actual procedural elements of imaginal exposure, as applied to the treatment of chronic worry. In other words, it is not clear that imaginal exposure must be carried out the way it is described in current treatment protocols, leaving open the possibility that there may be better ways to conduct imaginal exposure. Accordingly, an adaptation based on Pennebaker and Beall’s (1986) classical written disclosure paradigm has also
been developed and tested for GAD (termed written exposure; Goldman, Dugas, Sexton, & Gervais, 2007; Robichaud & Dugas, 2015).

Classic written disclosure involves writing repeatedly about stressful events that have occurred in one’s life, and one’s deepest feelings about these events (for reviews, see Frattaroli, 2006; Sloan & Marx, 2004). Typically, there are three to five sessions of writing, each lasting 15 to 20 min. The procedure has been used with individuals reporting post-traumatic stress disorder Criterion A events (Sloan, Marx, & Epstein, 2005) and has also been tested to target rumination in individuals high in dysphoria (Gortner, Rude, & Pennebaker, 2006; Sloan, Marx, Epstein, & Dobbs, 2008). Written disclosure has been associated with improvements in psychological health that are surprisingly durable (Frattaroli, 2006; Smyth, 1998).

In written exposure for GAD, individuals are instructed to write a detailed description of their worst fear coming true, as if it is happening in the here and now, with reference to their emotions, physical sensations, and reactions to the worst fear unfolding (Goldman et al., 2007). These instructions are designed to increase the concreteness and vividness of the fear narrative. Similar to the written disclosure procedure, individuals are instructed to write for about 20–30 min on at least 3 consecutive days and to write about their deepest emotions and thoughts. What distinguishes it from written disclosure is the focus on writing repeatedly about the same hypothetical future situation, versus past or ongoing stressful situations, and the emphasis on developing a concrete narrative.

Goldman, Dugas, Sexton, and Gervais (2007) compared the impact of written exposure to that of neutral writing across five 30-min sessions in a sample of individuals high in the tendency to worry. They found that participants in the written exposure condition showed significant improvements in worry, from baseline to 2-week follow-up ($d = 1.22$), whereas participants who engaged in neutral writing did not ($d = 0.45$). However, there were significant between-group differences at 2-week follow-up neither on worry ($d = 0.40$) nor on GAD-associated symptoms ($d = 0.22$).

Fracalanza, Koerner, and Antony (2014) examined the effects of three, 20-min sessions of written exposure on GAD symptoms. On each of 3 days, they asked participants to (a) write about the same worst-case scenario as per Goldman et al. (2007), (b) write about a different worst-case scenario related to the same worry theme, or (c) write about a neutral scenario. Writing repeatedly about the same worst-case scenario produced large significant decreases in worry from baseline to 1-week follow-up, ($d = 0.91$), whereas writing about a different worst-case scenario on each day or a neutral scenario did not ($d = 0.04$ and $d = 0.35$, respectively). Individuals who wrote repeatedly about the same worst-case scenario also demonstrated a large significant decrease in attempts to avoid imagining their worst fear as measured via a modified behavioral approach test ($d = 0.97$), whereas this effect was not seen in the other conditions ($d = 0.29$ and $d = 0.29$). Participants who wrote repeatedly about the same worst-case scenario also displayed a significant decrease in intolerance of uncertainty from baseline to 1-week follow-up, ($d = 0.70$), whereas those writing about different worst-case scenarios or the same neutral scenario did not ($d = 0.40$, $d < 0.01$). Despite significant within-group differences, there were no between-group differences on these outcomes at follow-up. However, the findings in Fracalanza and colleagues’ (2014) study are interesting, particularly regarding intolerance of uncertainty. Even though written exposure is not explicitly designed to modify negative beliefs about uncertainty, it seems to improve these beliefs nonetheless. Fracalanza and colleagues explained that by elaborating on their worst fear coming true, participants may have benefited from repeatedly confronting various types of uncertainty: the uncertain elements of their feared hypothetical situation, and the uncertainty of how they might react while writing about their worst fear coming true.

**Rescripting**

Based on existing theories of GAD, we propose that exposure could be enhanced by incorporating a rescripting component to the procedure. Although there is no existing literature on a rescripting intervention for GAD, the literature on imagery rescripting (IR) offers some direction as to how rescripting could augment the efficacy of written exposure for chronic worry. IR refers to a set of imagery techniques aimed at changing the negative meanings associated with memories of traumatic or distressing experiences. In Smucker, Dancu, Foa, and Niederee’s (1995) original three-step protocol, individuals are first asked to vividly recall and recount a distressing traumatic memory in the present tense (akin to imaginary exposure). Next, in the rescripting phase, they are asked to reimagine the event and to intervene, in the imagination, to gain a sense of mastery over the
distressing mental images. Finally, individuals are asked to develop images of their current adult-self comforting their past-self. Adaptations of IR have since been proposed; for example, Holmes, Arntz, and Smucker (2007) suggested that IR can be used to restructure “fantasy images” (p. 302) such as feared hypothetical outcomes. In all versions of IR, rescripting is intended to challenge and modify negative thoughts, feelings, and behaviors, or promote new, positive images to counteract key psychological concerns (Holmes, Arntz, & Smucker, 2007).

When applied to trauma, IR has been shown to decrease unhelpful post-traumatic stress disorder (PTSD)-related negative cognitions (negative beliefs about the self and the world, dysfunctional beliefs about personal responsibility; Long et al., 2011). When applied to social anxiety disorder, IR has been shown to modify negative beliefs about the self (e.g., “I am unlikable”) (Wild, Hackman, & Clark, 2007). What sets IR apart from other imagery modification treatments is that individuals create changes to their personal narratives so that the outcomes are not so unpleasant. This is accomplished through a Socratic style of questioning that encourages reflection and problem-solving (Rusch, Grunert, Mendelsohn, & Smucker, 2000).

A recent meta-analysis (Morina, Lancee, & Arntz, 2017) indicated that IR is efficacious in reducing psychological symptoms across a range of disorders (e.g., PTSD; social anxiety disorder; eating disorders; personality disorders; depression), showing a mean uncontrolled effect size of Hedge’s $g = 1.22$ from pre to posttreatment and $g = 1.79$ from pretreatment to follow-up (ranging between 1 week and 12 months). IR is also superior when compared to an active or passive control intervention, $g = 0.9$. Of note, relative to standard imaginal exposure, IR seems to have better effects on nonfear-related emotions, such as anger, shame or guilt, and may better address disorder-specific cognitions (i.e., trauma-related cognitions in PTSD, negative self-beliefs in social anxiety disorder and in bulimia nervosa; Morina et al., 2017).

Thus, if applied to GAD, some form of IR may be an optimal strategy to simultaneously address avoidance and unhelpful beliefs. As noted, individuals with GAD hold stable negative beliefs about uncertainty, problems, and emotions. Moreover, individuals high in worry overestimate the probability and cost (i.e., “badness”) of feared situations, and underestimate their ability to cope with them (Berenbaum, Thompson, & Bredemeier, 2007; Butler & Mathews, 1983). To date, no empirical studies have tested the effects of IR for individuals with GAD. In particular, there is a dearth of research on the effects of rescripting images or mental simulations of events that have never happened. It has been suggested that a common neural network underlies both memory and imagination (Holmes & Matthews, 2010; Schacter, 2012). Thus, this suggests the possibility that IR can be applied to modify prospective cognitions in individuals with GAD.

**Present study**

The present study is the first (to our knowledge) to apply IR principles to exposure for GAD. Given the novelty of the question, we tested the immediate (i.e., baseline to post-intervention) and short-term (i.e., 1-week and 1 month follow-ups) effects within a 3-session, 90-min intervention to determine the therapeutic potential of rescripting when it is integrated into written exposure.

The first objective was to examine whether written exposure enhanced with rescripting (RWE) is more efficacious in reducing worry and GAD symptoms than repeated written exposure to the same worst-case scenario without rescripting (WE) or repeated sessions of neutral writing (NC). It was hypothesized that participants in the RWE and WE conditions would show greater decreases in worry and GAD symptoms compared to participants in the neutral condition, and that the greatest decreases would be for participants assigned to RWE.

The second objective was to examine the degree to which worry-related processes improve following each of the exposure interventions. These processes included cognitive avoidance, intolerance of uncertainty, a negative problem orientation, negative beliefs about emotions, inflated perceptions about the likelihood and cost associated with one’s worst fear, and negative beliefs about one’s ability to cope with the worst fear. It was hypothesized that participants in the RWE and WE conditions would show greater decreases in worry and GAD symptoms compared to participants in the neutral condition, and that the greatest decreases would be for participants assigned to RWE.

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**Method**

**Participants**

An a priori power analysis was performed using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007),
to estimate the sample size needed to demonstrate a significant interaction between Time and Condition, using worry scores as an outcome. Research on IR interventions generally show moderate to large effect sizes (Morina et al., 2017). To observe a medium between-groups effect size (Cohen’s $f = .30$) with an $\alpha$ of .05 and a power of .80, a sample size of 90 individuals is required (about 30 per group).

$N = 317$ adults were recruited through online and print advertisements, and from a database of participants who had taken part in other studies in the Cognition and Psychopathology Lab at Ryerson University. Individuals were initially screened over the phone. The phone screen included questions to assess the potential presence of pathological worry and GAD symptoms, gateway questions from the Mini International Neuropsychiatric Interview (MINI), questions to rule out suicidality, as well as the Penn State Worry Questionnaire (PSWQ). Of the 317 individuals who participated in the phone screen, 105 passed it and were invited to the lab for a full administration of the MINI. Inclusion criteria were (1) age between 18 and 65 years; (2) endorsement of symptoms consistent with a principal diagnosis of DSM-5 GAD (American Psychiatric Association, 2013); (3) the presence of excessive worry as indicated by a PSWQ score of 62 or above, a cut-score that provides an optimal balance of sensitivity and specificity and effectively discriminates GAD from PTSD and depression (Behar, Alcaine, Zuellig, & Borkovec, 2003); (4) stable psychotropic medication dosage (if taking medication) for at least 6 weeks prior to study entry or, if discontinued medication, medication-free for 1 month (3 months for fluoxetine) for selective serotonin reuptake inhibitors; (5) no current endorsement of a bipolar and related disorder or psychotic disorder; (6) early or sustained remission in the case of substance use disorders; (7) no endorsement of current suicidal ideation, intent, or plan; (8) no psychotherapy in the past 3 months. Primary reasons for noneligibility included subclinical levels of worry, and symptoms consistent with another diagnosis (e.g., social anxiety disorder, depression) that was more severe than the individual’s GAD.

Eight of the 105 individuals scheduled for a first visit did not attend; the remaining 97 attended and received the MINI. Following the MINI, four individuals were not eligible. The remaining 93 individuals completed the baseline measures, were randomized to RWE, WE or NC, and completed their first writing session. Six individuals dropped out after the first writing session (two from the RWE condition, two from the WE condition, and two from the NC condition). An additional three individuals dropped out after the second writing session (one individual from each of the three conditions), making for a total of nine individuals who dropped out without completing all three writing sessions. There was no significant difference in number of dropouts between conditions, $\chi^2 = 0.55, p = .76$. These individuals were excluded from analyses to ensure that all participants in the analyses received the same dose of the assigned interventions. The remaining 84 participants completed all writing sessions. Data screening eliminated an additional five participants: (four for not adhering to writing instructions; and one participant aged 70). The final sample for analysis comprised 79 adults, 14 of whom did not complete follow-up visits (3 dropped out before the 1-week follow-up and 11 dropped out at 1-month follow-up; see Figure 1, for a flow of participants from initial phone screen through randomization and analysis). There was no significant difference in number of dropouts between conditions, $\chi^2 = 3.82, p = .15$. Participants who were eliminated from all data analysis and participants who were lost to follow-up were not significantly different from the rest of the sample on any demographic characteristics or other baseline measure scores.

Table 1 contains a summary of demographic and clinical characteristics of participants. The final sample comprised 65 females and 14 males, with ages ranging from 18 to 55 years ($M = 27.27$ years; $SD = 7.57$ years). Individuals with comorbid diagnoses were included in the study provided GAD was rated at least 2 points more severe on the Clinician’s Severity Rating ($M = 5.68, SD = 1.23$) (Di Nardo, Brown, & Barlow, 1994). The majority of the sample (75.7%) met diagnostic criteria for GAD only. PSWQ scores for the current sample were well above the established cut-score of 62 ($M = 69.29, SD = 4.65$), and the mean score on the Generalized Anxiety Disorder Questionnaire for the DSM-IV (GAD-Q-IV) was above 7.67, indicative of the presence of likely GAD ($M = 9.67, SD = 2.35$). $t$-tests and $\chi^2$ analyses indicated no significant differences between study conditions in any demographic or clinical characteristics.

**Measures**

**Screening measures.** The MINI Screen, Version 5.0.0 (Sheehan et al., 1998) is a brief preliminary screening
tool for the MINI. It consists of 21 closed-ended screening questions. Positive responses mean that the interviewer should conduct the corresponding module in the MINI to assess related symptoms in more detail. This version of the MINI Screen (for Axis-I DSM-IV disorders) has been shown to have high internal consistency ($\alpha = .92$; Sheehan et al., 1998). The screening questions have ranged from 61% to 83% on specificity and the accuracy of the questions has ranged from 70% to 75% (Alexander, Haugland, Lin, Bertollo, & McCorry, 2008). Given that a MINI Screen for DSM-5 was not available at the time the current study was conducted, gateway questions were adapted as appropriate to reflect DSM-5 criteria (e.g., frequency of eating disorder symptoms).

The MINI, Version 7.0.0 (Sheehan, 2015) is a semi-structured diagnostic interview that assesses the presence of certain DSM-5 disorders. Given the recent release of the MINI 7.0, psychometric properties are not yet available; however, the MINI for Axis-I DSM-IV disorders has shown excellent interrater reliability, with $\kappa$ coefficients that range from .88 to 1.0, good test–retest reliability for GAD, $r = .78$ to $r = .93$ (Lecrubier et al., 1997; Sheehan et al., 1998), and good specificity (86%) and sensitivity (91%) for all diagnoses (Sheehan et al., 1998). The MINI for Axis-I DSM-IV disorders also has shown high convergent validity in relation to other semistructured clinical interviews (Lecrubier et al., 1997; Sheehan et al., 1998).

The PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item self-report measure that assesses a general tendency to worry excessively. Scores range from 16 to 80, with higher scores reflecting greater levels of pathological worry. The PSWQ has demonstrated very high internal consistency ($\alpha = .86$ to .91) (Dear et al., 2011), and good test–retest reliability ($r = .74$ to $r = .92$; Startup & Erickson, 2006).
Measures of GAD symptoms. The Penn State Worry Questionnaire-Past Week (PSWQ-PW) (Stöber & Bittencourt, 1998) is an adaptation of the original PSWQ (Meyer et al., 1990) intended to capture pathological worry during the past week. The PSWQ-PW is thus sensitive to change and can be used to assess changes in pathological worry during an intervention (Stöber & Bittencourt, 1998). The
PSWQ-PW has demonstrated excellent internal consistency ($\alpha = .91$) and good test–retest reliability for a measure designed to assess change ($r = .59$), as well as good content and construct validity (Stöber & Bittencourt, 1998).

The GAD-Q-IV (Newman et al., 2002) is a 9-item self-report measure that assesses the DSM-IV diagnostic criteria for GAD. Given that the core diagnostic criteria for GAD remain unchanged in DSM-5, this tool is suitable to assess symptoms of DSM-5 GAD. A cutoff of 7.67 (85% sensitivity and 74% specificity) on the GAD-Q-IV indicates the presence of likely GAD (Moore, Anderson, Barnes, Haigh, & Fresco, 2014). The GAD-Q-IV total score has good test–retest reliability ($r = .83$) (Newman et al., 2002), high convergent validity with other measures of GAD features, and discriminant validity when compared against measures of depression (Robichaud & Dugas, 2008).

The Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994; English translation, Buhr & Dugas, 2002) is a 27-item self-report measure that assesses the habitual tendency to engage in strategies to avoid distressing thoughts and mental images. Higher scores indicate a greater tendency to engage in cognitive avoidance. The CAQ demonstrates excellent internal consistency ($\alpha = .95$), good test–retest reliability ($r = .85$) and good convergent and discriminant validity (Sexton & Dugas, 2008).

The Negative Problem Orientation Questionnaire (NPOQ; Gosselin, Pelletier, & Ladouceur, 2001; English translation, Robichaud & Dugas, 2005) is a 12-item self-report measure that assesses the tendency to view problems as a threat, doubt one’s own problem-solving ability, and be pessimistic about the outcome of problem-solving attempts. Higher scores indicate a more negative attitude toward problems. The NPOQ has high internal consistency ($\alpha = .91$) good test–retest reliability ($r = .80$), and good convergent and discriminant validity (Robichaud & Dugas, 2005).

The Affective Control Scale (ACS; Williams, Chambless, & Ahrens, 1997) is a 42-item self-report measure that assesses fear of emotions and attempts to control emotional experience. Higher scores indicating greater fear of emotions. The ACS has four subscales: (1) fear of anxiety, (2) fear of depression, (3) fear of anger, and (4) fear of positive emotions. The subscales have demonstrated good test–retest reliability ($r = .78$) and good internal consistency (Berg, Shapiro, Chambless, & Ahrens, 1998; Williams et al., 1997).

The Perceived Probability, Cost, and Coping Questions (Berenbaum et al., 2007; Butler & Mathews, 1983) assess the perceived probability, perceived cost, and perceived ability to cope with the worst-case scenario. Changes in these appraisals have previously been identified as being important indicators of cognitive change (e.g., Berenbaum et al., 2007). Perceived probability was assessed by asking respondents to rate the likelihood that their worst fear will come true, ranging from 0 “not at all likely” to 6 “almost certain.” Perceived cost was assessed by asking respondents to rate how bad it would be if their identified worst fear came true, from 0 “not at all bad” to 6 “horrible.” Perceived ability to cope was assessed by asking respondents to rate the extent to which they would be able to cope if their identified worst fear came true, from 0 “not at all” to 6 “would be able to cope.”

The Linguistic Inquiry and Word Count, 2007 (LIWC; Pennebaker, Booth, & Francis, 2007). The LIWC is a text analysis software program that can be used to classify the content of scripts according to several categories (e.g., first-person words, sensory-perceptual references, present-tense words, and emotion words). The software calculates the proportion of words in selected categories, relative to the total number of words in a script. In the present study, the LIWC was used as part of the manipulation check to examine whether participants followed condition-specific writing instructions.

**Procedure**

Participants who passed the telephone screen were invited to the lab for an in-person MINI interview to confirm the presence of a principal diagnosis of GAD. Those found to be eligible for the study were asked to complete a demographics questionnaire and a questionnaire package that included the following outcome measures: PSWQ-PW, GAD-Q-IV, CAQ,
IUS, NPOQ, and ACS. Participants also completed the Self-Assessment Manikin (SAM; Bradley & Lang, 1994), a pictorial assessment technique used to measure anxious arousal and unpleasant affect.

Following completion of baseline measures, participants were administered the Worry Domains Rating Form (WDRF; Fracalanza, Koerner, & Antony, 2014), developed to assess the degree to which participants worry about specific topics derived from research (Davey, Hampton, Farrell, & Davidson, 1992; Dugas et al., 1998; Freeston, Dugas, & Ladouceur, 1996). Items range from 0 “no worry” to 10 “extreme worry.” After identification of the primary worry domain, the experimenter worked with the participant to determine the worst-case scenario via the catastrophizing interview (Davey & Levy, 1998; Vasey & Borkovec, 1992; see Fracalanza et al., 2014 for an example). Participants were then administered the probability, cost, and coping questions.

Random assignment

Next, participants were randomly assigned to one of three conditions: (1) standard written exposure (WE), (2) written exposure with rescripting (RWE), or (3) neutral control (NC). Participants were informed that they would be asked to write on 3 consecutive days for 30 min each day. A meta-analysis on written disclosure, the writing intervention that partly informed the development of written exposure, has shown that at least three sessions of writing demonstrates greater effect sizes compared to fewer than three sessions and that writing for periods shorter than 15 min is associated with smaller effect sizes than is writing for at least 15 min (Frattaroli, 2006). All participants were informed that the purpose of the study was to examine the relationship between worry and writing.

All writing occurred alone, in a private room at Ryerson University. On each day, all participants were read the instructions about the writing that they would be asked to do and were given a written copy of these instructions. To assess anxious arousal and unpleasant affect, participants completed the SAM just prior to the writing session, 15 min into the writing session and at the end of the writing session. The SAM ratings were not part of the present analysis.

WE condition

Individuals assigned to the WE condition were asked to write on 3 consecutive days, a story (sensory image “script”) describing their worst fear coming true, as identified via the catastrophizing interview. Specifically, participants were instructed to: (1) write in narrative form, beginning with a description of the circumstances leading up to the feared scenario, followed by a description of the actual feared scenario, and ending with a description of the consequences of the scenario; (2) write in the present tense as though the situation is happening in the here-and-now; (3) write about their sensory-perceptual experience of the scenario (what they see, hear, etc. in the scenario); and (4) describe in detail, their emotional and physical reactions to the scenario.

RWE condition

On day 1, participants assigned to the RWE condition were asked to write a sensory image script describing their worst fear coming true (as per the WE condition). On day 2, participants were asked to write a sensory image script describing their worst fear coming true, and to write about how they move forward to improve the situation (e.g., “I am volunteering at the hospital to strengthen my application”) and how they change their attitude about the situation (e.g., “I trust that my friends will value and love me even if I am less prestigious than them”). On day 3, participants were asked to deepen their rescripting of their narrative by dedicating the whole session to writing about how they move forward and change their attitude about the feared situation. Participants were asked to write in first-person, present tense, as though they were responding to the situation in the here-and-now, with details regarding their emotional and physical reactions.

NC condition

Individuals assigned to the NC condition were asked to write on days 1 to 3 about what they would do if they found out they had the day off. They were asked to write in a completely factual way, with no reference to emotions or opinions. The neutral condition was employed to control for any therapeutic effects associated with the act of writing.

Follow-up sessions

Outcome measures were re-administered at the end of the third writing session and at 1-week and 1-month follow-ups. Participants were compensated at each visit, amounting to a total of CAD$55. Participants were debriefed at their final visit.
Results

Between-condition differences at baseline

Table 2 displays means and standard deviations for GAD symptoms and processes at baseline, post-intervention, 1-week, and 1-month follow-up separated by condition. One-way analyses of variance (ANOVAs) indicated there were no significant between-group differences at pre-intervention.

Manipulation checks

Two manipulation checks assessed the degree to which participants followed writing instructions. The principal investigator and a second evaluator blind to the assigned conditions read the contents of each participant’s set of scripts. Scripts were categorized according to which of the three writing instructions they adhered to (i.e., written exposure with rescripting, standard written exposure, neutral control). Scripts for which content deviated from the writing instructions (e.g., writing about a different worst-case scenario each day; lack of a concrete worst-case scenario; writing a vague description of how to move forward from the worst-case scenario) were coded as “not adhering” to instructions. The interrater reliability for the raters was high, $\kappa = .947$, $p < .01$ and four participants were excluded from all analyses for not following writing instructions.

The LIWC (Pennebaker et al., 2007) was used to analyze the content of scripts by calculating the proportion of words in selected categories. ANOVAs were conducted to examine whether the three conditions differed on their use of first-person words, sensory-perceptual references, present-tense words, and emotion words. Conditions were not significantly different in total number of generated words, $p = .99$, indicating that script lengths were similar across conditions. One-way ANOVAs showed a significant difference between conditions in the proportion of personal to impersonal pronouns, $F(2, 77) = 13.89$, $p < .001$. Bonferroni post hoc tests showed that participants in both exposure conditions (RWE, WE) used significantly more present-tense words ($M = 43.66$, $SD = 6.16$; $M = 47.45$, $SD = 8.04$) relative to future or past tense words, than did those in the NC ($M = 35.54$, $SD = 7.25$), $p < .01$, with no significant differences between the exposure conditions. There was also a significant difference between conditions in the proportion of negative emotion to total words, $F(2, 77) = 91.58$, $p < .01$. Participants in both exposure conditions (RWE, WE) included more negative emotion words in their narratives (i.e., sad, anxious, angry) ($M = 10.10$, $SD = 3.49$; $M = 10.57$, $SD = 2.85$) than did those in the NC ($M = 1.62$, $SD = 1.14$), $p < .01$. There were no differences between the exposure conditions. Regarding proportion of positive emotion words to total words, there was a significant difference between conditions $F(2, 77) = 11.34$, $p < .001$. Participants in the RWE condition included more positive emotion words in their narratives (i.e., happy, excited) ($M = 10.79$, $SD = 3.11$) than did those in the WE or NC conditions ($M = 7.45$, $SD = 3.20$; $M = 6.72$, $SD = 3.53$), $p < .01$

Hypothesis testing

Hypotheses were tested using Hierarchical Linear Modeling (HLM; Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004). Specifically, each outcome measure was analyzed using piecewise growth models, which are able to capture precise patterns of change (Bollen & Curran, 2006). In psychotherapy research, change tends to occur in distinct phases, such as a period of rapid improvement during the treatment phase, followed by a reduced period of change in the follow-up phase (e.g., Keller et al., 2000; Young, Kranzler, Gallop, & Mufson, 2012). Therefore, in the current study, the first piece was composed of the active intervention (i.e., change from baseline to writing session 3). The second piece was composed of the follow-up phase (i.e., change from post-intervention to 1-month follow-up). A fixed linear slope was estimated for the first piece and a random slope and intercept were specified in the second piece of the growth model. First, an unconditional growth model was estimated (i.e., irrespective of
Table 2. Means and standard deviations for outcome measures at baseline, post-intervention, 1-week, and 1-month follow-up.

| Measure          | RWE  
|                 | (n = 26)^a | Within Cohen’s d | WE (n = 27)^b | Within Cohen’s d | NC (n = 26)^c | Within Cohen’s d |
|------------------|------------|-----------------|---------------|-----------------|--------------|-----------------|
| PSWQ-PW          |            |                 |               |                 |              |                 |
| Baseline         | 68.41 (12.14) | —               | 68.18 (9.05)  | —               | 67.60 (9.68) | —               |
| Post-intervention| 63.84 (14.82) | 0.43            | 63.34 (12.18) | 0.61            | 64.15 (13.59) | 0.43            |
| I-week           | 63.23 (15.95) | 0.60            | 62.52 (11.10) | 0.60            | 60.93 (13.90) | 0.57            |
| I-month          | 62.86 (16.16) | 0.44            | 61.58 (13.16) | 0.48            | 59.55 (19.38) | 0.50            |
| GAD-Q-IV         |            |                 |               |                 |              |                 |
| Baseline         | 9.72 (2.65)  | —               | 9.78 (1.66)   | —               | 9.93 (2.65)  | —               |
| Post-intervention| 9.04 (2.63)  | 0.30            | 9.53 (1.82)   | 0.22            | 9.20 (3.35)  | 0.20            |
| I-week           | 9.04 (2.39)  | 0.15            | 9.57 (1.87)   | 0.17            | 9.14 (3.32)  | 0.27            |
| I-month          | 9.18 (2.59)  | 0.04            | 9.20 (2.11)   | 0.28            | 8.35 (3.85)  | 0.48            |
| CAQ              |            |                 |               |                 |              |                 |
| Baseline         | 71.62 (19.22) | —               | 72.11 (17.55) | —               | 71.66 (24.72) | —               |
| Post-intervention| 69.65 (20.84) | 0.19            | 72.39 (16.53) | -0.03           | 73.14 (21.87) | 0.015           |
| I-week           | 66.04 (20.56) | 0.42            | 67.73 (17.51) | 0.34            | 73.50 (25.45) | -0.07           |
| I-month          | 67.16 (17.93) | 0.27            | 71.00 (18.26) | 0.08            | 65.94 (27.27) | 0.22            |
| IUS              |            |                 |               |                 |              |                 |
| Baseline         | 90.77 (18.57) | —               | 90.26 (15.38) | —               | 84.15 (23.28) | —               |
| Post-intervention| 91.94 (22.62) | -0.06           | 87.38 (18.93) | 0.28            | 82.07 (21.33) | 0.22            |
| I-week           | 90.66 (21.97) | 0.007           | 90.26 (15.38) | 0.001           | 80.18 (21.92) | 0.33            |
| I-month          | 89.21 (21.67) | 0.08            | 90.12 (16.11) | 0.011           | 76.47 (23.71) | 0.64            |
| NPOQ             |            |                 |               |                 |              |                 |
| Baseline         | 41.85 (8.21)  | —               | 39.52 (9.12)  | —               | 36.84 (12.48) | —               |
| Post-intervention| 40.15 (9.20)  | 0.20            | 39.48 (9.85)  | 0.007           | 37.92 (10.59) | -0.11           |
| I-week           | 40.50 (10.24) | 0.15            | 38.38 (10.54) | 0.12            | 38.59 (10.94) | -0.17           |
| I-month          | 40.20 (9.43)  | 0.18            | 39.32 (8.75)  | 0.02            | 36.37 (13.02) | 0.04            |
| ACS              |            |                 |               |                 |              |                 |
| Baseline         | 164.19 (35.21) | —               | 166.57 (20.72) | —               | 156.80 (33.71) | —               |
| Post-intervention| 158.15 (38.82) | 0.39            | 159.91 (20.47) | 0.48            | 153.69 (36.32) | 0.09            |
| I-week           | 153.75 (43.91) | 0.54            | 156.19 (22.03) | 0.64            | 153.09 (40.30) | 0.10            |
| I-month          | 154.72 (43.51) | 0.49            | 156.19 (22.03) | 0.64            | 153.00 (40.32) | 0.12            |
| Probability      |            |                 |               |                 |              |                 |
| Baseline         | 2.92 (1.70)  | —               | 3.19 (1.62)   | —               | 3.15 (1.62)  | —               |
| Post-intervention| 2.88 (1.34)  | 0.02            | 3.27 (1.31)   | 0.06            | 3.16 (1.75)  | 0.01            |
| I-week           | 3.17 (1.20)  | 0.14            | 3.35 (1.44)   | 0.12            | 3.09 (1.57)  | 0.07            |
| I-month          | 3.35 (1.39)  | 0.22            | 3.42 (1.06)   | 0.17            | 2.95 (1.68)  | 0.18            |
| Cost             |            |                 |               |                 |              |                 |
| Baseline         | 5.12 (1.07)  | —               | 5.07 (1.17)   | —               | 5.27 (0.87)  | —               |
| Post-intervention| 4.23 (1.53)  | 0.64            | 4.96 (1.08)   | 0.08            | 5.12 (1.24)  | 0.14            |
| I-week           | 4.71 (1.30)  | 0.31            | 5.08 (0.89)   | 0.007           | 5.09 (1.23)  | 0.18            |
| I-month          | 4.70 (1.26)  | 0.31            | 5.13 (1.04)   | 0.05            | 4.84 (1.34)  | 0.36            |
| Coping           |            |                 |               |                 |              |                 |
| Baseline         | 2.27 (1.66)  | —               | 2.70 (1.54)   | —               | 2.58 (1.63)  | —               |
| Post-intervention| 3.19 (1.78)  | 0.40            | 3.00 (1.58)   | 0.16            | 2.36 (1.75)  | 0.15            |
| I-week           | 3.08 (1.77)  | 0.38            | 2.65 (1.52)   | 0.03            | 2.86 (1.83)  | 0.17            |
| I-month          | 2.65 (1.66)  | 0.18            | 2.79 (1.53)   | 0.05            | 2.75 (1.58)  | 0.13            |

Note. RWE = written exposure with rescripting; WE = standard written exposure; NC = neutral control; PSWQ-PW = Penn State Worry Questionnaire Past-Week; GADQ-IV = Generalized Anxiety Disorder Questionnaire for DSM-IV; CAQ = Cognitive Avoidance Questionnaire; IUS = Intolerance of Uncertainty Scale; NPOQ = Negative Problem Orientation Questionnaire; ACS = Affective Control Scale; Probability = perceived probability; Cost = perceived cost; Coping = perceived coping; within Cohen’s d = within-group Cohen’s d value representing the magnitude of the change in scores from Baseline to each time point.

^aOne participant in the RWE condition dropped out at 1-week follow-up; four dropped out at 1-month follow-up.

^bTwo participants in the WE condition dropped out at 1-month follow-up.

^cTwo participants in the NC condition dropped out at 1-week follow-up; five dropped out at 1-month follow-up.
condition), to determine change over time (coded in days) for all participants over each piece. Fourteen participants did not complete follow-up visits (3 dropped out before the 1-week follow-up, and 11 dropped out at 1-month follow-up), however, HLM allows for computation of estimates for missing data using a restricted maximum likelihood approach to estimate variance-covariance components; therefore, it is not problematic to have a different number of data points for each individual (Raudenbush et al., 2004). Second, condition was contrast-coded to capture each of the following comparisons: RWE versus NC, WE versus NC, and RWE versus WE, and was included as a level 2 predictor, to examine between-condition differences in rates of change for each piece (i.e., Condition \times Time interaction). Furthermore, given the absence of any empirical studies that have tested the effects of rescripting for GAD, we deemed it important to determine whether the rate of change (or slope) within each condition differed significantly from zero. This approach allowed us to test whether each writing condition had any significant impact on the rate of change. SPSS for Windows, Version 25.0 was used to organize the data and perform the analyses. 

Objective 1: Symptoms

Worry. The piecewise growth model showed a statistically significant negative mean estimate of the slope in piece 1 ($b = -0.93, SE = 0.35, p = .01$), suggesting a mean reduction in PSWQ-PW scores between baseline and post-intervention for the entire sample. A significant slope in piece 2 ($b = -0.12, SE = 0.06, p = .05$) suggested that on average, participants continued to improve during the follow-up period. None of the contrasts (i.e., Contrast 1 = RWE vs. NC; Contrast 2 = WE vs. NC; Contrast 3 = RWE vs. WE) significantly predicted the slopes in piece 1 (Contrast 1, $b = 0.47, SE = 0.86, p = .58$; Contrast 2, $b = -0.72, SE = 0.85, p = .40$; Contrast 3, $b = 1.19, SE = 0.85, p = .16$) or piece 2 (Contrast 1, $b = -0.17, SE = 0.16, p = .29$; Contrast 2, $b = 0.06, SE = 0.15, p = .69$; Contrast 3, $b = -0.23, SE = 0.15, p = .12$). With respect to the rate of change within each condition, all slopes during the intervention period were significant ($b = -1.54, SE = 0.61, p = .01$ for RWE; $b = -1.09, SE = 0.61, p < .05$ for WE; and $b = -0.38, SE = 0.59, p < .05$ for NC). During the follow-up period, only participants in the WE condition continued to show significant decline in PSWQ-PW scores ($b = -0.22, SE = 0.10, p < .05$).

GAD symptoms (GAD diagnostic criteria). The piecewise growth model showed a statistically significant negative mean estimate of the slope in piece 1 ($b = -0.14, SE = 0.05, p < .01$), suggesting a mean reduction in GAD-Q-IV scores between baseline and post-intervention for the entire sample. A nonsignificant slope in piece 2 ($b = -0.006, SE = 0.009, p = .54$) suggested that on average, participants neither deteriorated nor continued to improve at follow-up. None of the contrasts significantly predicted the slopes in piece 1 (Contrast 1, $b = -0.21, SE = 0.12, p = .08$; Contrast 2, $b = -0.19, SE = 0.12, p = .12$; Contrast 3, $b = -0.02, SE = 0.12, p = .85$) or piece 2 (Contrast 1, $b = -0.03, SE = 0.02, p = .28$; Contrast 2, $b = -0.004, SE = 0.02, p = .86$; Contrast 3, $b = -0.02, SE = 0.03, p = .34$). With respect to the rate of change within each condition, only participants in the RWE condition showed a significant decline in GAD-Q-IV scores over the intervention period ($b = -0.27, SE = 0.09, p < .01$).

Objective 2: Worry-related processes

Cognitive avoidance. The piecewise growth model showed that time was a statistically significant predictor of CAQ slopes neither in piece 1 ($b = -0.37, SE = 0.36, p = .30$) nor piece 2 ($b = -0.08, SE = 0.06, p = .20$), suggesting that on average, CAQ scores did not change over time. With respect to the rate of change within each condition, none showed a significant decline in CAQ scores, all $ps > .23$.

Intolerance of uncertainty. The piecewise growth model showed that time was a statistically significant predictor of IUS slopes neither in piece 1 ($b = -0.41, SE = 0.39, p = .30$) nor piece 2 ($b = -0.07, SE = 0.05, p = .17$), suggesting that on average, IUS scores did not change over time. With respect to the rate of change within each condition, only participants in the WE condition showed a decline in IUS scores during the intervention period that approached significance ($b = -1.08, SE = 0.58, p = .06$).

Negative problem orientation. The piecewise growth model showed that time was a statistically significant predictor of NPOQ slopes neither in piece 1 ($b = -0.10, SE = 0.24, p = .69$) nor piece 2 ($b = -0.02, SE = 0.04, p = .65$), suggesting that on average, NPOQ scores did not change over time. With respect to the rate of change within each condition, none showed a significant decline in NPOQ scores, all $ps > .43$. 
Fear of emotion. The piecewise growth model showed a statistically significant negative mean estimate of the slope in piece 1 ($b = -2.20, SE = 0.53, p < .001$), suggesting a mean reduction in ACS scores between baseline and post-intervention for the entire sample. A nonsignificant slope in piece 2 ($b = -0.08, SE = 0.69, p = .25$) suggested that on average, participants neither deteriorated nor continued to improve at follow-up. None of the contrasts significantly predicted the slopes in piece 1 (Contrast 1, $b = 1.37, SE = 1.31, p = .30$; Contrast 2, $b = 1.38, SE = 1.29, p = .29$; Contrast 3, $b = -0.009, SE = 1.30, p = .99$) nor piece 2 (Contrast 1, $b = -0.05, SE = 0.17, p = .78$; Contrast 2, $b = 0.035, SE = 0.17, p = .84$; Contrast 3, $b = 0.08, SE = 0.17, p = .62$). With respect to the rate of change within each condition, only the slopes for the RWE and WE conditions were significant over the intervention period, ($b = -2.65, SE = 0.94, p < .001$ for RWE; $b = -2.65, SE = 0.90, p < .001$ for WE; and $b = -1.27, SE = 0.93, p = .17$ for NC). Individual emotions were further examined in subsequent analyses.

Fear of anxiety. The piecewise growth model showed a statistically significant negative mean estimate of the slope in piece 1 ($b = -0.57, SE = 0.25, p < .05$), suggesting a mean reduction in ACS fear of anxiety scores between baseline and post-intervention for the entire sample. A nonsignificant slope in piece 2 ($b = -0.003, SE = 0.04, p = .94$) suggested that on average, participants did not deteriorate or improve at follow-up. None of the contrasts significantly predicted the slopes in piece 1 (Contrast 1, $b = -0.02, SE = 0.62, p = .97$; Contrast 2, $b = 0.26, SE = 0.61, p = .67$; Contrast 3, $b = 0.28, SE = 0.61, p = .64$) or piece 2 (Contrast 1, $b = -0.02, SE = 0.62, p = .97$; Contrast 2, $b = 0.11, SE = 0.09, p = .79$; Contrast 3, $b = -0.02, SE = 0.09, p = .79$). With respect to the rate of change within each condition, only the slope for the WE condition was significant over the intervention period ($b = -0.76, SE = 0.43, p < .05$; $b = -0.47, SE = 0.44, p = .28$ for RWE; and $b = -0.49, SE = 0.44, p = .26$ for NC).

Fear of anger. The piecewise growth model showed a statistically significant negative mean estimate of the slope in piece 1 ($b = -0.54, SE = 0.16, p = .001$), suggesting a mean reduction in ACS fear of anger scores between baseline and post-intervention for the entire sample. A nonsignificant slope in piece 2 ($b = -0.04, SE = 0.02, p = .10$) suggested that on average, participants did not deteriorate or improve at follow-up. None of the contrasts significantly predicted the slopes in piece 1 (Contrast 1, $b = 0.31, SE = 0.39, p = .43$; Contrast 2, $b = -0.20, SE = 0.39, p = .61$; Contrast 3, $b = 0.02, SE = 0.05, p = .73$) or piece 2 (Contrast 1, $b = 0.02, SE = 0.05, p = .69$; Contrast 2, $b = 0.04, SE = 0.05, p = .45$; Contrast 3, $b = 0.51, SE = 0.38, p = .19$). With respect to the rate of change within each condition, only the slope for the RWE condition was significant over the intervention period, ($b = -0.82, SE = 0.28, p < .01$; $b = -0.31, SE = 0.27, p = .25$ for WE; and $b = -0.51, SE = 0.27, p = .07$ for NC).

Fear of positive emotion. The piecewise growth model showed a statistically significant negative mean estimate of the slope in piece 1 ($b = -0.84, SE = 0.25, p = .001$), suggesting a mean reduction in fear of positive emotion subscale scores between baseline and post-intervention for the entire sample. A nonsignificant slope in piece 2 ($b = -0.008, SE = 0.35, p = .83$) suggested that on average, participants did not deteriorate or improve at follow-up. None of the contrasts significantly predicted the slopes in piece 1 (Contrast 1, $b = 0.92, SE = 0.61, p = .13$; Contrast 2, $b = 1.10, SE = 0.59, p = .07$; Contrast 3, $b = -0.13, SE = 0.60, p = .83$) or piece 2 (Contrast 1, $b = 0.02, SE = 0.09, p = .83$; Contrast 2, $b = 0.02, SE = 0.08, p = .85$; Contrast 3, $b = 0.04, SE = 0.09, p = .68$). With respect to the rate of change within each condition, only the slopes for the RWE and NC conditions were significant over the intervention period ($b = -1.12, SE = 0.44, p = .01$ for RWE; $b = -1.24, SE = 0.39, p < .01$ for NC; and $b = -0.14, SE = 0.43, p = .73$ for WE).

Fear of depressed mood. The piecewise growth model showed that time was a statistically significant predictor of ACS fear of depression scores neither in piece 1 ($b = -0.19, SE = 0.14, p = .17$) nor piece 2 ($b = -0.01, SE = 0.24, p = .68$), suggesting that on average, fear of depression scores did not change over time. With respect to the rate of change within each condition, none of the conditions showed a significant decline in fear of depression scores, all $ps > .31$.

Perceived probability. The piecewise growth model showed that time was a statistically significant predictor of perceived probability scores neither in piece 1 ($b = 0.07, SE = 0.044, p = .87$) nor piece 2 ($b = 0.006, SE = 0.005, p = .26$), suggesting that on average, perceptions of the probability of the worst fear.
coming true did not change over time. With respect to the rate of change within each condition, none of the conditions showed a significant decline in perceived probability, all \( p_s > .14 \).

**Perceived cost.** The piecewise growth model showed a statistically significant negative mean estimate of the slope in piece 1 (\( b = -0.098, SE = 0.04, p = .02 \)), suggesting a mean reduction in perceived costliness of the feared scenario between baseline and post-intervention for the entire sample. A nonsignificant slope in piece 2 (\( b = 0.0012, SE = 0.005, p = .74 \)) suggested that on average, participants did not deteriorate or improve at follow-up. Contrasts 1 and 3 (i.e., RWE vs. NC; RWE vs. WE) significantly predicted the slope in piece 1 (\( b = 0.19, SE = 0.10, p = .05; b = -0.21, SE = 0.10, p = .03 \)), suggesting that participants in the RWE condition showed significantly greater reductions in perceived cost scores than did participants in the NC and WE conditions. Contrast 2 (\( b = -0.02, SE = 0.10, p = .85 \)) was not significant. With respect to the rate of change within each condition, only the slope for RWE was significant during the intervention period (\( b = -0.23, SE = 0.07, p = .001 \) for RWE; \( b = -0.02, SE = 0.07, p = .76 \) for WE; and \( b = -0.04, SE = 0.07, p = .58 \) for NC).

**Perceived coping.** The piecewise growth model showed a statistically significant positive mean estimate of the slope in piece 1 (\( b = 0.12, SE = 0.06, p = .04 \)), suggesting a mean increase in perceived ability to cope with the feared scenario between baseline and post-intervention for the entire sample. A nonsignificant slope in piece 2 (\( b = -0.002, SE = 0.007, p = .75 \)) suggested that on average, participants did not deteriorate or improve at follow-up. Contrast 1 (i.e., RWE vs. NC) significantly predicted the slope in piece 1 (\( b = -0.30, SE = 0.14, p = .04 \)), suggesting that participants in the RWE condition showed significantly greater increases in perceived coping ability than did participants in the NC condition. Contrast 2 (\( b = -0.05, SE = 0.14, p = .73 \)) and Contrast 3 (\( b = -0.25, SE = 0.14, p = .08 \)) were not significant. With respect to the rate of change within each condition, only the slope for RWE was significant during the intervention period (\( b = 0.31, SE = 0.10, p = .003 \) for RWE; \( b = 0.05, SE = 0.10, p = .58 \) for WE; and \( b = 0.005, SE = 0.10, p = .96 \) for NC).

**Discussion**

The first objective of the present study was to determine whether written exposure with rescripting (RWE) is more efficacious in reducing worry and GAD symptoms than standard written exposure (WE) or neutral writing (NC). Results did not support the hypotheses that (1) participants in the exposure conditions would show significantly greater decreases in worry and GAD symptoms compared to participants in the neutral writing condition and (2), that improvements would be most pronounced for participants in the written exposure with rescripting condition. Multilevel models showed that worry significantly decreased in all three conditions during the intervention period, to a similar degree. However, only participants in the written exposure with rescripting condition also showed significant decreases on GAD-Q-IV scores during this period.

The second objective was to determine the degree to which worry-related processes improve following each of the exposure interventions. Results partially supported the hypotheses that (1) participants in the exposure conditions would show significantly greater improvements in these processes than participants in the neutral control condition and (2), that improvements would be most pronounced for participants in the written exposure with rescripting condition. With regard to cognitive avoidance and negative problem orientation, there were no significant changes or between group differences. Regarding intolerance of uncertainty, the within condition analyses showed that only participants in the standard written exposure condition showed a decrease in their intolerance of uncertainty; however, this was a marginally significant change. Regarding overall fear of emotion, participants in each of the exposure conditions showed significant reductions over the intervention period, whereas participants who engaged in neutral writing did not. Specifically, participants in the standard written exposure condition showed reductions in fear of anxiety, whereas those in the written exposure with rescripting condition showed reductions in fear of anger and fear of positive emotion. Interestingly, those assigned to write about a neutral topic also reported a significant decrease in their fear of positive emotion. None of the writing interventions appeared to have an impact on fear of depression. Finally, there were no significant within- or between-condition differences in the perceived probability of the worst fear identified via the catastrophizing interview. However,
by the end of the intervention, participants in the written exposure with rescripting condition perceived their worst fear as less costly and perceived themselves as being better able to cope with it; participants in the other writing conditions did not show these cognitive changes. Taken together, there was some limited support for the predicted effects of written exposure on worry-relevant processes.

Consistent with Fracalanza et al. (2014) and Goldman et al. (2007), the results of the current study showed that individuals who wrote repeatedly about the same worst fear coming true reported significant decreases in worry from baseline to follow-ups; however, effects were smaller in the present study (d = .60 at 1-week follow-up and d = .48 at 1-month follow-up) even though the writing instructions were exactly the same as in previous research. Comparison of the present study to past work rules out intervention dose as an explanation, as participants in the present study engaged in the same number of writing sessions as in Fracalanza et al. (2014), and they wrote for longer. However, average trait worry was higher in the present sample than in the samples of Goldman et al. (2007) and Fracalanza et al. (2014), and accordingly participants may have been less responsive to such a brief written exposure intervention. Written exposure with rescripting did not have an appreciably different impact on worry in the present study relative to standard written exposure; however, the rescripting intervention was associated with a decline in scores on a measure of the severity of DSM GAD symptoms. These decreases in worry and GAD symptom severity observed in the rescripting condition were restricted to the intervention period, whereas worry continued to decline following standard written exposure, therefore on balance, it appears that standard written exposure may have greater therapeutic potential. But any interpretation of the effects of the exposure interventions on worry is tentative at best given that in the present study, participants in the neutral writing condition also reported significant reductions in worry during the intervention period that were similar in magnitude to those observed in the exposure conditions (d = .57 at 1-week follow-up and d = .50 at 1-month follow-up). This was surprising given that previous studies (Fracalanza et al., 2014) employing the same control condition showed only a small change in worry following neutral writing. Prior work on written disclosure wherein neutral writing has been employed as the control condition has shown that participants rate neutral writing (i.e., writing about time management and future plans) as a credible technique for reducing stress (Lumley & Provenzano, 2003; Radcliffe, Lumley, Kendall, Stevenson, & Beltran, 2007). Thus, participants in the present study may have expected to benefit in some way from the neutral writing. Moreover, consistent with Fracalanza et al. (2014), participants in the neutral writing condition tended to write about pleasurable, goal-directed activities that they would like to engage in if they had free time. Research has shown that writing about goals may be beneficial because it promotes a sense of accomplishment (King, 2001), and that individuals who write about positive experiences show enhanced psychological well-being (Burton & King, 2009). Moreover, a study by Eagleson, Hayes, Mathews, Perman, and Hirsch (2016) showed that any positive mentation (i.e., generating images of positive outcomes to worry scenarios, verbalizing positive outcomes to worry scenarios, or generating positive imagery) was associated with a reduction in worry. Stated differently, it may be that directing attention toward nonworry-related content may inadvertently lead to improved outcomes. Thus, being engaged in neutral writing may have helped participants to manage their worry, at least temporarily. Future studies on written exposure should employ a control writing condition that does not inadvertently encourage writing about potentially positive or constructive experiences.

Another similarity of the current study, compared to prior work on written exposure, pertained to the finding that participants in the standard written exposure condition showed near-significant improvements tolerating uncertainty from baseline to post-intervention (d = 0.28). Both Fracalanza et al. (2014) and Goldman et al. (2007) found significant improvements in intolerance of uncertainty from baseline to follow-up (d = 0.72 and d = 0.44, respectively). There are a few potential explanations as to why the magnitude of the effect was not as large in the current study. First, participants in Goldman et al.’s (2007) study received five, 30-min sessions of written exposure to the worst-case scenario, whereas participants in the current study received only three. Second, participants in Fracalanza et al.’s (2014) study had lower mean PSWQ and IUS scores (M = 63.09, SD = 8.07; M = 84.03, SD = 20.66, respectively) than did those in the current sample (M = 69.29, SD = 4.65; M = 88.65, SD = 19.12). Research has shown that intolerance of uncertainty and excessive worry are strongly correlated (e.g., Buhr & Dugas, 2006;
Dugas, Freeston, & Ladouceur, 1997), and that individuals who do not improve following CBT for GAD continue to endorse elevated levels of intolerance of uncertainty (e.g., Donegan & Dugas, 2012; Dugas et al., 2010). This suggests that at higher levels of excessive and uncontrollable worry, as was the case for participants in the current study, intolerance of uncertainty may be less likely to change, especially with such a brief intervention.

It is also interesting that participants in the written exposure with rescripting condition did not show any changes in their intolerance of uncertainty; whereas there was a marginally significant decline in the standard written exposure condition during the intervention period. According to the intolerance of uncertainty model, repeated imaginal exposure to feared situations should have therapeutic effects on intolerance of uncertainty, because individuals learn to challenge the meanings given to uncertain future events (Dugas & Koerner, 2005). Intolerance of uncertainty causes individuals with GAD to overfocus on potential negative outcomes in uncertain situations, making these outcomes seem more likely and more catastrophic (Dugas et al., 1998). In the current study, it may be that individuals in the standard written exposure condition had opportunities to repeatedly confront a scenario where the likelihood of occurrence was uncertain. In line with this, Dugas and Robichaud (2007) proposed that exposure to uncertain elements within a feared scenario, as well as exposure to uncertainty about how one may feel while elaborating on their feared scenario may help improve tolerance for uncertainty. It is possible that individuals in the rescripting condition had fewer opportunities to confront uncertain outcomes and feelings of uncertainty, because they had instructions in the second and third sessions to write about how to move forward and change their attitude about the worst fear; therefore, perhaps participants in this condition received a smaller “dose” of exposure to uncertainty. Stated differently, rather than have participants “sit” with uncertainty, the rescripting intervention may have attenuated or eliminated uncertainty and may have provided participants with temporary control over their feared scenario. Perhaps, then, rescripting targets problem orientation—beliefs about one’s capacity to effectively solve problems; however, in the present study, none of the interventions were associated with any change in NPO.

To help elucidate why NPO did not change, it is important to consider the degree to which NPO is distinct from other constructs, such as perceived control or self-efficacy (Fergus, Valentiner, Wu, & McGrath, 2015). As noted by Fergus, Valentiner, Wu, and McGrath (2015), in social problem-solving theory, perceptions of control are central to the conceptualization of problem orientation (Nezu, 2004), and are relevant to the development of emotional disorders (Barlow, 2002). According to Barlow (2002), diminished perceptions of control relate to a perceived inability to alter aversive events (e.g., “The extent to which a difficult situation resolves itself has nothing to do with my actions”; “There is little I can do to change frightening events”) and are most commonly assessed using the Anxiety Control Questionnaire—Revised (ACQ-R; Brown, White, Forsyth, & Barlow, 2004). The NPOQ, on the other hand, captures negative self-efficacy beliefs centered around problem-solving ability (i.e., “I often doubt my capacity to solve problems”) (Robichaud & Dugas, 2005). Robichaud and Dugas (2005) found that NPO was strongly associated with but distinct from self-mastery, which is an aspect of perceived control (Perlin & Schooler, 1978). Thus, it may be that participants in the written exposure with rescripting condition were improving on their perceived ability to alter frightening events, but that the NPOQ was unable to capture this. In line with this, the cost and coping estimates showed that by the end of the intervention, participants in the written exposure with rescripting condition did perceive themselves as being better able to cope in the event of the worst-case scenario, and also saw their feared scenario as less “bad.” These findings are consistent with one of the stated goals of imaginal exposure for GAD: to enable individuals to realize that even if their worst fear did come true, they would in fact be able to cope (van der Heiden & ten Broeke, 2009). Interestingly, those in the standard written exposure condition did not show changes in their appraisals of their worst fear, suggesting that some form of explicit cognitive re-evaluation is needed to shift threat perceptions. Some worry exposure protocols encourage consideration of alternative outcomes after clients have spent time imagining their feared situation. We propose here that exposure with rescripting takes this a step further by having individuals mentally “rehearse” coping with the worst fear and develop what essentially is a written plan for what they can do to prevent or improve their feared situation. It may be that people have to repeat this process with many different kinds of hypothetical scenarios before changes in NPO can be detected.
Participants in both exposure conditions reported significant reductions on the ACS, a measure of the fear of emotions. Several theories suggest that individuals with GAD have negative beliefs about emotions and engage in motivated efforts to prevent or control intense emotions. According to Borkovec’s Avoidance Theory of Worry, worry is a verbal-linguistic behavior used to dampen images of frightening situations, and the associated aversive arousal that accompanies these images (Borkovec, Alcaine, & Behar, 2004). Borkovec and colleagues (e.g., Heide & Borkovec, 1984) also proposed that people with GAD avoid being in a relaxed state, which suggests that even positive states can be threatening for people with GAD. The Emotion Dysregulation Model extends Borkovec’s theory by suggesting a more direct relationship of worry to emotional avoidance. Written exposure with and without rescripting requires individuals to write intentionally about their deepest emotions and feelings and their bodily sensations, thus this common element of the writing procedures may challenge negative beliefs about emotions.

For example, perhaps participants learned that allowing themselves to think concretely about their worst fear did not actually result in unbearable emotions or a loss of control over emotions. An interesting finding to emerge was that participants who received standard written exposure reported a significant decline in fear of anxiety, whereas those who engaged in structured rescripting of their worst fear reported a significant reduction in fear of anger and fear of positive emotion. These findings suggest that standard written exposure, and written exposure with rescripting may operate on different emotions. Given that individuals engaging in standard written exposure were repeatedly writing about their feared situation, there may have been repeated activation of anxiety or fear (versus other emotions) over sessions. Written exposure with integrated rescripting may not have provided participants with as much opportunity to experience anxiety, as they swiftly moved to writing about how to improve or move forward from their feared situation at the second session. But, other emotions may have been activated and addressed through the rescripting intervention. In line with this, research in the PTSD literature has shown that imaginal exposure enhanced with rescripting leads to improved outcomes for nonfear PTSD emotions such as anger, guilt, and shame, whereas imaginal exposure alone does not (Arntz et al., 2007). It is thought that IR not only facilitates expression of inhibited emotions, but also allows for their reevaluation (Arntz et al., 2007). It may be that written exposure with rescripting provided people with the opportunity to express and reevaluate feelings of anger about their feared scenario. Threatening and uncertain situations, especially when they are experienced as unfair or unexpected (e.g., being let go of a job unexpectedly; being made to wait for important and potentially devastating news), are a potent trigger of anger (Anderson, Deschénes, & Dugas, 2016).

Many participants in the present study wrote about such situations. As noted earlier, rescripting may have offered some degree of mastery or control over feared situations, which may have momentarily reduced fear of experiencing anger.

That the rescripting intervention was associated with a decrease in fear of positive emotion is in line with research suggesting that individuals with GAD have an elevated fear of consequences of positive emotion (Mennin, Holaway, Fresco, Moore, & Heimberg, 2007). This result can be understood from the perspective of the Contrast Avoidance Model of worry, which explains that individuals with GAD fear positive emotion because they do not want to feel vulnerable and experience a sudden negative shift in emotion (Newman & Llera, 2011). Our manipulation check showed that participants in the rescripting condition referenced positive emotions significantly more than did participants assigned to the other conditions. This suggests that perhaps explicitly asking individuals in the written exposure with rescripting condition to write about how to move forward and change their attitude toward the worst fear allowed for participants to “let their guard down,” in turn targeting the belief that positive emotion is threatening or unpleasant. Participants in the neutral condition also reported a reduction in fear of positive emotion, which may be because they had repeated opportunities to experience positive emotion while writing about what they would do if they had the day off.

Neither of the exposure conditions demonstrated reductions in habitual cognitive avoidance. This may reflect a problem with the way cognitive avoidance was measured in the present study. The CAQ is a measure of habitual efforts to avoid distressing thoughts and mental images and thus may not have been sensitive to detect changes in acute cognitive avoidance. Fracalanza et al. (2014) developed a modified behavioral approach test, which involved asking participants to imagine their worst-case scenario for 30 s, and rate their fear in response to, and their desire
to avoid, the image. They found that following the intervention, participants who had engaged in standard written exposure reported significantly less fear and avoidance when imagining their worst-case scenario. Therefore, in the current study, perhaps the CAQ was unable to capture reductions in momentary or “state” cognitive avoidance.

It is also important to note that it remains a possibility that the passage of time, regression to the mean, or nonspecific factors, such as positive contact with the experimenter, and motivation to change may have contributed to improved outcomes for participants across conditions. These nonspecific factors were shared by all conditions, and therefore may have accounted for improved outcomes for all participants. This last point is consistent with a large body of research which suggests that nonspecific factors are significant mediators of change in treatment (e.g., Blease, Lilienfeld, & Kelley, 2016; Cuijpers, 2016).1

This is the first known adaptation of rescripting as a potential intervention for chronic worry. This study was designed as an extension of prior research on written exposure for GAD, and had several strengths. First, the sample comprised individuals with a principal diagnosis of GAD, and thus findings are relevant to clinical samples. Second, multilevel models were used to examine both the immediate and short-term (1-month) effects of the interventions, allowing modeling of the stability of the interventions over a longer time period compared to prior work on written exposure for worry and GAD. Third, unlike previous studies on written exposure for GAD and worry, the present study considered the effects on a broader range of processes.

The current study also had a number of limitations. First, it may have been difficult to detect differences between exposure conditions because the writing interventions were too similar. For example, the first writing session and part of the second writing session were identical in both exposure conditions. Increasing the dose of the rescripting or deepening it may be important. Second, our neutral writing condition may not have been truly neutral, making it difficult to parse out differences between the exposure and neutral conditions. There have been discussions regarding the challenges of selecting appropriate control conditions in experimental psychopathology research (Blackwell, WOULD, & MacLeod, 2017). Although the neutral writing condition that we employed was similar to ones used in the written disclosure literature, it may not be suitable for research on written exposure for chronic worry. Third, whereas studies in other clinical populations that have combined exposure with rescripting have shown that one to three sessions of exposure prior to rescripting can be efficacious (e.g., Arntz et al., 2007; Grunert, Weis, Smucker, & Christianson, 2007), perhaps this is inadequate for individuals with GAD. However, given that this was a proof of concept therapy experiment and that the rescripting intervention was modelled partly on brief rescripting interventions that have been shown to be efficacious, the present study was a reasonable, cost- and time-efficient first step in ascertaining the therapeutic potential of rescripting for chronic worry. Future research should investigate the effects of an intervention that contains a more extensive exposure component combined with a more extensive rescripting component, to address the potential issue of dose. Finally, as noted earlier in the Discussion, choice of outcome measures may also have been a factor in the inability to detect within-condition and between-conditions differences on some outcomes. This was discussed mainly in relation to the measurement of cognitive avoidance; however, the same issue applies to the measures of beliefs about uncertainty, problems and emotions. It may be that the interventions were not long or extensive enough to detect significant changes on these measures. On the other hand, written exposure with rescripting has beneficial effects on more proximal outcomes like one’s perceptions about the costliness of and ability to cope with the feared scenario. Stated differently, it may be that a brief course of written exposure with or without rescripting has beneficial effects but mainly on outcomes that relate directly to the particular scenario that a person has written about. This raises the question as to why significant, durable improvements in symptoms and cognitive processes have been shown with written disclosure, the brief intervention on which written exposure is modeled, or even with other IR interventions (e.g., for PTSD). We propose that the main factor is that individuals with GAD are writing about a hypothetical event that has never happened and may never happen; whereas in written disclosure and trauma-oriented rescripting interventions, participants are writing about a past trauma or an ongoing real-life stressor. For people with GAD, there potentially are many pathways to their core feared outcome, or many core feared outcomes. In a brief written exposure intervention, an individual is focusing on only one “version” of their fear narrative, when there likely are several versions. That is, although the goal of the
intervention is to have individuals arrive at their core fear(s), there may be multiple ways in which the fear(s) can be accessed. Imaginal or written exposure may be more challenging to apply in the treatment of chronic worry due to the instability and multiplicity of fear narratives.

In terms of future research, little is known about the optimal parameters of the written exposure procedure. Parameters including frequency, duration, and spacing of sessions are in need of further investigation. Further, an aspect of the written exposure procedure that requires investigation is what the exposure target ought to be. For example, the Contrast Avoidance Model proposes that it may be more potent and effective to expose people to mental images of unexpected feared events, because such events are more emotionally evocative than are events that are overtly negative (Newman & Llera, 2011; Sexton & Dugas, 2009). Thus, future research could examine whether exposure interventions can be used to elicit unexpected negative shifts in emotion. This differs from prior studies of imaginal exposure and from current treatment recommendations for GAD, which have emphasized prolonged exposure to mental images of the worst-case scenario.

This was the first study to adapt IR for GAD and examine whether written exposure enhanced with rescripting is more efficacious in reducing worry and related processes than repeated exposure to the same worst-case scenario. Although the present study was unable to establish superiority of written exposure enhanced with rescripting, it provided novel insights into the potential effects of written exposure interventions and ideas for future research. Written exposure is a promising strategy for GAD, but questions remain regarding how best to conduct it, its mechanisms, and the degree to which the benefits endure.

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