1-1-2011

Experimental Manipulation of Processing Style: Impact on Interpretive Bias, Problem Solving, and Worry in Individuals with Generalized Anxiety Disorder

Elizabeth Jane Pawluck
Ryerson University

EXPERIMENTAL MANIPULATION OF PROCESSING STYLE: IMPACT ON INTERPRETIVE BIAS, PROBLEM SOLVING, AND WORRY IN INDIVIDUALS WITH GENERALIZED ANXIETY DISORDER

by

Elizabeth Jane Pawluk

BA Honours, University of Western Ontario, 2008

A thesis

presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Master of Arts

in the Program of

Psychology

Toronto, Ontario, Canada, 2011

Author's Declaration

I hereby declare that I am the sole author of this thesis or dissertation.

I authorize Ryerson University to lend this thesis or dissertation to other institutions or individuals for the purpose of scholarly research.

_____

Elizabeth Jane Pawluk

I further authorize Ryerson University to reproduce this thesis or dissertation by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

_____

Elizabeth Jane Pawluk

Abstract

Experimental Manipulation of Processing Style: Impact on Interpretive Bias, Problem Solving, and Worry in Individuals with Generalized Anxiety Disorder

Master of Arts, 2011

Elizabeth Jane Pawluk

Psychology

Ryerson University

The present study investigated whether individuals with generalized anxiety disorder (GAD) could be trained to adopt an abstract or concrete processing style and the impact of processing style training on GAD symptoms and cognitive processes, including an interpretation bias, negative problem solving orientation, poor problem solving, and worry. Participants (N = 47) were trained to adopt an abstract or concrete processing style, and outcome measures were completed at posttraining and 1 week follow-up. At posttraining, processing style training was effective in inducing an abstract or concrete processing style. In addition, at posttraining, the concrete training condition reported reduced concern with ambiguous scenarios and produced problem solutions that were rated as more effective compared with the abstract training condition. At follow-up, there was no difference between training conditions on processing style and associated GAD symptoms and cognitive processes. Study limitations and future directions are discussed.

Acknowledgements

I would like to express my sincere gratitude to my advisor, Dr. Naomi Koerner, for her guidance, encouragement, and dedication to my learning over the past 2 years. Your genuine passion for research was a constant source of motivation. I would also like to thank my supervisory committee member, Dr. Martin Antony for his guidance and support throughout the thesis process. I am also grateful to Dr. Candice Monson who generously agreed to serve on my examining committee. I would also like to thank Ms. Teresa Mejia for her valuable contributions to data entry and coding. Moreover, I would like to thank the Canadian Institutes of Health Research for providing me with funding while I completed my thesis. To my wonderful lab mates and fellow graduate students, thank you for your encouragement and friendship over the past 2 years. Finally, I would like to thank my parents for their unconditional love. Your words of wisdom and encouragement are always there just at the right time and I would not be where I am today without your support.

Table of Contents

List of Tables

List of Appendices

Experimental Manipulation of Processing Style: Impact on Interpretive Bias, Problem Solving, and Worry in Individuals with Generalized Anxiety Disorder

Worry is a normative thought process that most individuals experience in everyday life (Tallis, Davey, & Capuzzo, 1994). However, when worry becomes chronic, excessive, and uncontrollable, and leads to distress or impairment, it becomes a hallmark feature of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association, 2000) -defined generalized anxiety disorder (GAD). Although worry can be experienced as distressing, individuals may perceive it as a means to prevent or attenuate the intensity of a perceived future catastrophe (Borkovec & Roemer, 1995). Paradoxically, the situations that individuals with GAD worry about are typically hypothetical and have a low probability of occurrence (Borkovec, Alcaine, & Behar, 2004). As such, worry is often futile.

Functions of Worry

In 1983, Borkovec, Robinson, Pruzinsky, and DePree offered a working definition of worry, which stated that:

> Worry is a chain of thoughts and images, negatively affect-laden and relatively uncontrollable. The worry process represents an attempt to engage in mental problem solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes. Consequently, worry relates closely to the fear process (p.10).

Borkovec and colleagues' definition highlighted several defining features of worry, including problem solving, uncertainty, and future-oriented thoughts and images.

Early studies of worry sought to determine the type of mentation (i.e., verbal thought or mental imagery) that was most frequent during a worry episode. Borkovec and Inz (1990) examined the thought-imagery ratio of mentation samples from individuals with and without

GAD under two conditions, worry and relaxation. The authors reported that during relaxation, the frequency of verbal thoughts and mental images was equal in individuals with GAD, whereas participants without an anxiety disorder reported a higher frequency of mental images. Alternatively, when participants thought about a topic they worry about, both groups reported that verbal thoughts were more frequent than were mental images. To account for the difference in mentation content between worry and relaxation, Borkovec and Inz suggested that worry might be a form of mental monologue that reflects a motivated use of verbal thoughts to avoid negative mental images.

The findings by Borkovec and Inz (1990) provided an empirical foundation for the avoidance theory of worry (see Borkovec, Ray, & Stöber, 1998), which proposes that the verbal content of worry suppresses mental imagery of feared future events. Specifically, "worrying in words" may attenuate the uncomfortable physiological arousal brought about by mental images of negative events (Tucker & Newman, 1981). At the time when Borkovec and colleagues developed their theory, the mechanism by which worry may suppress mental imagery was not identified; however, dual coding theory (Paivio, 1971, 1986) offered an explanation.

According to dual coding theory, verbal cognitive activity has a direct impact on the vividness of its associated mental imagery (Paivio, 1971, 1986). Paivio's work demonstrated, for example, that abstract words (e.g., science, heaven) evoke mental images that are slow to form and low on vividness, whereas concrete words (e.g., table, grapefruit) evoke mental images that form rapidly and are high in vividness. Paivio and Marschark (1991) concluded that the concreteness of language has a significant role in the vividness of mental imagery.

To connect Borkovec and Paivio's theories, Stöber (1998) proposed the reduced concreteness theory of worry. He suggested that the abstract quality of worry results in mental

imagery that is less vivid and consequently, less physiologically arousing, distressing, and attention-grabbing (Borkovec et al., 2004). For example, if one worries about a situation in an abstract way (e.g., "something bad is going to happen"), the mental images that are evoked would be less vivid compared to thinking about the same situation in concrete terms (e.g., "When I go see my boss later this afternoon, she is going to inform me that I am fired"). As a result, individuals may report a higher percentage of verbal thought compared to mental images during episodes of worry, but this may be because the mental images are not as vivid and therefore, individuals may have difficulty detecting them (Borkovec et al., 1998).

Taken together, individuals with GAD may report that worrying functions as a means of preventing a feared outcome (Borkovec & Roemer, 1995). Moreover, due to the abstract properties of worry, it may also have the "unintended" effect of attenuating emotional arousal. Mental images of feared scenarios are often emotionally activating; therefore, worry may function as a means to avoid or dampen mental imagery of feared hypothetical scenarios and the emotional arousal that accompanies it (Borkovec & Inz, 1990). Borkovec and colleagues (1983, 1998) proposed that despite its "benefits," worry might be problematic in the long run, as it is associated with avoidance, physical tension, and the development of future hypothetical catastrophes.

Understanding Abstract Thinking from a Nonclinical Perspective: Implications for Excessive Worry

On the one hand, worry may be potentially pathogenic at excessive levels and on the other hand, it may be associated with emotional benefits. Theories outside of clinical psychology, specifically the construal level theory (for a review, see Trope & Liberman, 2003, 2010), were examined to provide a better understanding of the potential short-term benefits of

worry that Borkovec and colleagues have alluded to in their work.

The construal level theory (Trope & Liberman, 2003, 2010) describes how individuals construct and experience events that are outside of their immediate awareness. According to Trope and Liberman (2010), events and objects outside of an individual's direct experience can vary in psychological distance on any of the following dimensions: time, space, social context, and hypotheticality. The theory states that mental representations of an event or object that are abstract are experienced as more psychologically distant (i.e., more removed from a person's direct experience), whereas mental representations that are concrete are experienced as more proximal (Trope & Liberman, 2010). In other words, thinking about an event or object in an abstract way (i.e., with an abstract processing style) makes the event or object "feel" more distant; whereas the opposite is true when thinking about an event or object in a concrete way (i.e., with a concrete processing style).

Given that worry often consists of future-oriented repetitive thought (Borkovec et al., 1983), the temporal dimension of psychological distance is of particular interest. According to the theory, memories of past events and predictions of the future are mental representations (i.e., construals) that can vary in their level of concreteness, depending on their distance in time (Trope & Liberman, 2003). Construals of temporally distant events tend to be abstract, simple, and contain little contextual detail (high-level construals), whereas mental representations of proximal events often are more concrete, complex, and contain more contextual detail (low-level construals). Trope and Liberman (2010) noted that the association between level of construal and distance is bidirectional. Thinking about an event or object in an abstract or concrete way influences psychological distance, whereas thinking about events or objects at varying psychological distances can influence level of concreteness. Moreover, training to adopt an

abstract or concrete processing style can influence cognitions and behaviours in subsequent unrelated tasks (Förster, Friedman, & Liberman, 2004; Trope & Liberman, 2010).

Trope and Liberman (2010) proposed that adopting an abstract processing style when thinking about distant situations confers several benefits. For example, high-level construals paradoxically enhance appraisals of self-control, improve the outcomes of interpersonal negotiations and are beneficial in situations in which creative solutions to a problem are required (Förster et al., 2004; Trope & Liberman, 2010). In addition, Armor and Sackett (2006) found that individuals report higher optimism for hypothetical events that are psychologically distant. Furthermore, Heller, Stephan, Kifer, and Sedikides (2011) demonstrated that construal level could influence how individuals imagine themselves and their lives to be in the future. When asked to adopt a distant future perspective of themselves and their lives, participants predicted that they would experience more positive affect and a positive change in personality relative to when participants thought about themselves and their lives in the near future.

Alternatively, Förster and colleagues (2004) examined whether there are certain conditions under which shifting into a distant time perspective could be maladaptive and potentially undermine task performance. Indeed, the authors found that for analytical problems in particular, a temporally removed, abstract processing style impeded the development of effective solutions, whereas a more concrete, here-and-now perspective led to solutions that were more effective. Taken together, an abstract mode of processing may confer advantages under specific circumstances; however, there may be times when a distant time perspective shift is not beneficial and possibly impairing.

How might construal level theory apply to worry? As noted earlier, worry has been described as a future-oriented, abstract form of thinking (Stöber, 1998). The construal level

theory would predict that for individuals with GAD, shifting into an abstract mode of processing might be of some benefit. For one, shifting into an abstract mode of processing may make feared hypothetical scenarios feel more remote, or psychologically distant (Trope & Liberman, 2003). Alternatively, the decontextualized and abstract quality of worry may interfere with systematic information processing (i.e., thinking rationally about what is known and unknown about a situation) and the development of effective problem solutions.

Potential Negative Impact of Abstract Thinking on Information Processing and Problem-Solving

Construal level theory suggests that an abstract processing style increases psychological distance, which may confer emotional benefits to the worrier. However, abstract thinking can also be detrimental in at least two ways: (1) it may interfere with information processing and (2) it may impede direct attempts at problem solving.

Worry and the interpretation of ambiguous information. Ambiguous scenarios (i.e., situations that can be interpreted in more than one way or situations in which the outcome is unknown or uncertain) are present in the everyday environment. Often ambiguous situations or events can evoke either a threatening or a benign interpretation; however, for individuals with high levels of worry or GAD, the former is often the case (MacLeod, & Rutherford, 2004). Early theories by Beck (e.g., Beck, Emery, & Greenberg, 1985) attribute the development of GAD to a maladaptive cognitive structure known as the "danger schema," which facilitates threatening interpretations of ambiguous scenarios. In addition, heightened hypervigilance for threatening information (Eysenck, 1997) and an intolerance for uncertainty (Koerner & Dugas, 2008) in individuals with GAD may influence the development of negative appraisals for ambiguous scenarios.

Taken together, there appears to be a connection between excessive worry and negative interpretations of ambiguous or uncertain situations. Furthermore, the focus on potential future negative outcomes may shift the worrier away from a present-moment focus and distract the individual from processing information in his or her immediate environment. As a result, a future-oriented, abstract processing style may interfere with reasoning in uncertain situations, may in turn perpetuate worry and the perception of ambiguous situations as threatening.

Worry and problem solving. When asked to reflect on a period of worry, approximately 50% of individuals report that they were problem solving (Szabó & Lovibond, 2002). However, high levels of worry have been shown to be associated with *lower* problem-solving success (Szabó & Lovibond, 2002), which is independent of poor problem-solving skills (Davey, 1994). The reduced concreteness theory of worry (Stöber, 1998) suggests that at high levels of worry, individuals process their environment at an abstract level, which may interfere with problem-solving performance. Stöber, Tepperwien, and Staak (2000) examined the problem elaborations (i.e., descriptions of possible risks and negative consequences) of situations that individuals worried about, compared to situations that they did not worry about, in an undergraduate student sample. Responses were rated on degree of concreteness. In line with the predictions of the reduced concreteness theory of worry, problem descriptions were found to be significantly less concrete for topics that individuals worried about than for topics that individuals did not worry about. Therefore, although individuals with GAD perceive their worry as a means of problem solving (Borkovec et al., 1983), the results of this study suggest that worry may make it difficult for individuals to identify and define their problem in the first place. As a result, the abstract nature of worry might be detrimental to developing effective problem solutions, as a concrete problem definition is fundamental to the later stages of problem solving (i.e., development of

problem solutions; D'Zurilla & Goldfried, 1971).

In addition, Dugas, Letarte, Rhéaume, Freeston, and Ladouceur (1995) reported that problem orientation might impact problem-solving performance in individuals with worry. Problem orientation reflects individuals' perceptions and reactions to problems and their beliefs about their problem-solving ability. Although problem orientation can facilitate or inhibit problem-solving performance, it is independent of actual problem-solving skill (Ladouceur, Blais, Freeston, & Dugas, 1998). Furthermore, Robichaud and Dugas (2005b) reported that a *negative* problem orientation (i.e., a negative attitude toward problems and the problem-solving process) is often found in individuals with high-trait worry.

The negative influence of worry on the development of concrete problem solutions may lead individuals to believe that their problems are insurmountable or that they do not have adequate problem-solving skills. As a result, the abstract quality of problem descriptions and negative problem orientation associated with worry may potentially hamper problem-solving performance in individuals whose skills are adequate. It is unknown how exactly these cognitive processes derail problem solving, but presumably it occurs in the earlier stages of the problem-solving process.

Evidence that Reducing Abstract Thinking May Have Benefits for Individuals with GAD

Problem definitions and problem solutions that are high in concreteness may be fundamental to successful problem solving (Schönpflug, 1984, as cited by Stöber et al., 2000). Schönpflug stated that concrete thoughts about the antecedents and consequences of a problem assist with facilitating problem solving. Therefore, training individuals with GAD to concretize their thoughts may improve their ability to develop effective problem solutions.

Stöber and Borkovec (2002) provided initial support for the benefit of reducing abstract

thinking. The authors rated the concreteness of problem elaborations that individuals with GAD generated before and after cognitive behavioural therapy (CBT). Although CBT for GAD does not specifically train concreteness, based on the construal level theory, the present-focus temporal orientation of CBT may encourage concrete thinking (Trope & Liberman, 2010). In the study, participants identified two major problems that they worry about and wrote short problem descriptions and potential negative consequences for both problems. At posttreatment, concreteness of problem elaborations was associated with greater reductions in worry. Although none of the strategies in the CBT package was designed specifically to concretize thinking, the findings suggest at the very least, that processing mode is not "fixed" and that increases in concretization may lead to reductions in worry. These conclusions are tentative, however, as the intervention did not directly target or modify processing mode.

Research on the Training of Concrete Processing

There has been no direct examination of whether cognitive processing style may have a causal role in information processing biases, problem solving and negative problem orientation, or worry in individuals with GAD. The most direct attempt at examining the potential causal role of modifying cognitive processing style has been in the literature examining rumination in depression. Many researchers have discussed the similarities between worry and rumination. For example, both are abstract, chronic, repetitive thought processes. In addition, rumination is associated with negative appraisals of ambiguous situations (Watkins, 2008) and reduced concreteness of problem elaborations (Watkins & Moulds, 2007). A fundamental distinction between worry and rumination, however, is the temporal orientation of each type of repetitive thought; worry is more future-oriented and rumination is more past-oriented (Watkins, Moulds, & Mackintosh, 2005).

To investigate the role of processing style training on rumination, Watkins and Moulds (2005) examined the impact of training concrete versus abstract self-focused rumination on problem solving in depressed patients and a never-depressed control group. The rumination manipulation required participants to read 28 self-focused items (e.g., "focus on the physical sensations in your body"). In the concrete condition, participants were given the following instructions:

> As you read the items, use your imagination and concentration to focus your mind on each experience. Spend a few moments visualizing and concentrating on your experience, attempting to find a phrase, image, or set of words that best describes the quality of what you sense. (p. 322)

In the abstract condition, participants were instructed:

> As you read the items, use your imagination and concentration to think about the causes, meanings, and consequences of the items. Spend a few moments visualizing and concentrating on each item, attempting to make sense of and understand the issues raised by each item. (p. 322)

All participants completed one of four problems from the *Means-Ends Problem-Solving Task* (MEPS; Platt & Spivack, 1975) prior to training and completed the three remaining problems at posttraining to assess participants' problem-solving ability. Each problem solution on the MEPS was rated on the development of discrete steps to move a person towards successful resolution of the problem and the effectiveness of the problem solution. In addition, as a manipulation check for the induction of abstract or concrete self-focus, problem solutions on the MEPS were rated using Stöber et al.'s (2000) rating scale for concreteness. Following training, participants in the abstract self-focus condition (regardless of a history of depression)

developed problem solutions that were rated as significantly less concrete compared to the concrete self-focus condition. Moreover, the abstract self-focus condition generated fewer problem-solving steps and less effective problem solutions than did participants in the concrete self-focus condition. These findings indicate that the induction of concrete self-focus resulted in the formation of problem solutions that were rated as more effective.

Later work by Watkins, Moberly, and Moulds (2008) examined the impact of construal level on emotional reactivity in a never-depressed sample. The authors hypothesized that training a processing style characterized by high-level construals would cause individuals to become despondent following a failure experience. Participants were trained to engage in either high-level construals (consistent with depressive rumination) or low-level construals (inconsistent with depressive rumination). The training consisted of 15 positive and 15 negative written scenarios. For each scenario, participants in the high-level construal condition were instructed to "think about why it happened and to analyze the causes, meanings and implications of this event" (p. 366). Conversely, participants in the low-level construal condition were instructed to "focus on how it happened, and to imagine in your mind as vividly and concretely as possible a 'movie' of how this event unfolded" (p. 366). An example of a negative scenario is as follows:

> You have an argument with your best friend. You have only had a few minor disagreements in the past, but this argument becomes heated and she tells you that she feels that she will never be able to trust you again. You are shocked and hurt. (p. 366)

Following training, all participants performed an anagram stress task, which consisted of 15 difficult anagrams and 15 unsolvable anagrams. The participants were told that performance on the task was an indicator of their future academic and career success. On average, participants solved 1 out of 30 anagrams. At the completion of the task, participants received feedback that

they had scored below average on the task as a means of stress induction. The findings indicated that participants in the high-construal condition reported greater negative affect following feedback on the task compared to participants in the low-construal condition. As a manipulation check for construal level training, participants provided a solution to a single problem from the MEPS (Platt & Spivack, 1975). The manipulation was effective; participants in the high-construal training condition produced problem-solving descriptions that were more abstract. These findings provided additional support that processing style is not rigid and that processing style training can have a direct influence on reactions to a stressor and subsequent negative affect.

Present Study

Goals and Hypotheses

The main study goals were (1) to determine whether cognitive processing style could be manipulated to be more abstract or more concrete in individuals with GAD and (2) to examine the influence of cognitive processing style training on interpretation of ambiguous scenarios, quality of problem solutions and level of worry in individuals with GAD. The study consisted of three assessments: pretraining and posttraining (Session 1), and 7-day follow-up (Session 2). Between the two sessions, participants were asked to keep record of their daily levels of worry and anxiety, and to write about a personal problem that they were confronted with during the week and attempted to solve.

Based on the reduced concreteness theory of worry (Stöber, 1998) it was hypothesized that (1) prior to training there would be an existing relationship between abstract processing style and negative appraisals of ambiguous, positive and negative scenarios, greater negative problem orientation, poorer problem-solving styles, and increased tendency to worry. In addition, based on Watkins and colleagues' (2008) work on training of abstract and concrete cognitive processing styles, it was hypothesized that (2) cognitive processing style in individuals with GAD could be manipulated to be more abstract or concrete. In addition, it was hypothesized that compared to participants in the abstract training condition, participants in the concrete training condition would:

(3) appraise positive, negative, and ambiguous situations less negatively, and that differences between the training conditions would be most pronounced for ambiguous situations;

(4) report a greater decrease in negative problem orientation and a greater use of more adaptive problem-solving strategies; produce more effective solutions in response to hypothetical and real

problems; and perceive their own problem-solving attempts as more effective;

(5) report a greater decrease in worry and anxiety between session 1 and 2.

Method

Participants

Participants were recruited from Ryerson University via flyers, and from the surrounding community via newspaper and online advertisements (i.e., *Craigslist* and *Kijiji*). Individuals interested in participating completed a telephone screen to determine their eligibility. In total, 134 individuals took part in the screen and of those individuals, 68 were eligible and 66 were ineligible for the study. Inclusion criteria included (1) a principal diagnosis of GAD (American Psychiatric Association, 2000); (2) no current psychotherapy; (3) stable medication dosage (if taking medication) for at least 6 weeks prior to study entry; (4) no history of schizophrenia, bipolar disorder, or organic mental disorder; (5) no evidence of substance abuse or dependence in the 6 months prior to study entry; (6) no evidence of anxiety symptoms due to a general medical condition (e.g., hyperthyroidism, hypoglycemia); and (7) no evidence of suicidal intent.

Of the individuals not eligible for the study, 57 individuals were excluded either because they did not endorse symptoms of GAD or because they reported symptoms that were consistent with a principal diagnosis of another disorder. Individuals with comorbid conditions, rated less severe than the principal diagnosis of GAD, were included to ensure that the study sample was representative of individuals with GAD seen in clinical settings.

Of the 68 individuals invited to participate in the study, 14 individuals did not begin the study and 7 participants did not complete all study requirements and were excluded from statistical analysis. The final sample consisted of 47 participants: 24 participants were randomly assigned to the abstract training condition and 23 participants were randomly assigned to the concrete training condition.

Demographic characteristics. In total 47 participants completed the study, including 32

women and 15 men. Participants ranged in age from 18 to 64 years (M = 38.81, SD = 13.01). In terms of ethnocultural background, 57.4% of participants self-identified as White, 8.5% as East Asian, 8.5% as Latin American, 6.4% as South Asian, 4.3% as Black, 2.1% as Arab or West Asian, 6.4% as mixed ethnicity, and 6.4% as 'Other' (i.e., ethnicity was not listed). The majority (56.5%) of participants indicated that they were single, 28.3% reported being married, and 15.2% reported being either separated or divorced. Of the 47 participants, 12 reported being currently enrolled in an educational program (9 in university and 3 in adult education). Of the participants not currently enrolled in an education program (n = 35), 22.9% had a high school diploma; 34.2% had a college diploma, 22.9% had an undergraduate degree, 14.3% had a masters degree and 5.7% had a doctoral degree. Participants in the training conditions did not differ on age, ethnicity, marital status, or highest level of education attained. However, there were significantly more individuals attending an educational program (n = 10) in the concrete training condition, as compared to the abstract training condition (n = 2), $X^2(1) = 7.63$, $p < .01$.

Clinical characteristics. All participants reported symptoms meeting criteria for a principal diagnosis of GAD on the *Mini International Neuropsychiatric Interview* (MINI; Sheehan et al., 1998). The assessor (EJP) determined a principal diagnosis of GAD if the interviewees reported no other psychological symptoms that were deemed more severe or distressing than their GAD-related symptoms. To confirm a GAD diagnosis, participants completed the *Generalized Anxiety Disorder Questionnaire–IV* (GAD-Q-IV; Newman et al., 2002), a diagnostic self-report measure of GAD at session 1. In the current sample, GAD-Q-IV scores ranged from 3.33 to 13 (M = 10.02, SD = 2.18), with 91.4% of the sample producing scores that exceeded the recommended cut score of 5.7. In addition, participants completed the *Penn State Worry Questionnaire* (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), a self-

report measure of the tendency to worry excessively. Several cut scores have been established for the PSWQ to identify individuals with probable GAD in a nontreatment-seeking sample. Behar, Alcaine, Zuellig, and Borkovec (2003) reported that a cut-score of 45 on the PSWQ is appropriate for screening when recruiting from the community versus a student population. In the current sample, all participants scored above 45 on the PSWQ. Provencher, Dugas, and Ladouceur (2004) stated that a cut score of 55 would differentiate between clinical and nonclinical worry; 91.5% of participants in the study scored above 55 on the PSWQ. Finally, Fresco, Mennin, Heimberg, and Turk (2003) reported that in a specialized anxiety clinic, a cut score of 65 is required to differentiate GAD from social anxiety disorder (SAD). Of the current sample, 55.3% scored above 65 on the PSWQ. In the current study, participants' scores on the PSWQ ranged from 48 to 80 (M = 66.18, SD = 8.23).

Of the 47 participants included in the study, 19 participants (40.4%) reported symptoms that met diagnostic criteria only for GAD. Of participants who reported symptoms that met criteria for a comorbid disorder (n = 28), 71.4% participants reported symptoms that met for a mood disorder diagnosis (e.g., major depressive disorder), and 78.6% of participants had symptoms that met for another anxiety disorder (e.g., SAD). There was no significant difference between the training conditions on the proportion of participants with or without a comorbid diagnosis. Among participants who had a comorbid diagnosis, there was no significant difference between training conditions on the type of diagnosis (i.e., mood disorder or another anxiety disorder). See Table 1 for a summary of the demographic and clinical characteristics of participants in the present study.

Table 1

Sample Characteristics Separated by Training Condition

	Concrete Training *n* = 23	Abstract Training *n* = 24
Age in years - *M* (*SD*)	35.22 (13.14)	42.25 (12.16)
Gender - Frequency (%)		
Female	17 (73.9)	15 (62.5)
Male	6 (26.1)	9 (37.5)
Ethnocultural Background - Frequency (%)		
White	10 (43.5)	17 (70.8)
East Asian	3 (13.0)	1 (4.2)
South Asian	3 (13.0)	0 (0)
Latin American	2 (8.6)	2 (8.3)
Mixed Race	2 (8.6)	1 (4.2)
Other Ethnicity	1 (4.3)	2 (8.3)
Black	1 (4.3)	1 (4.2)
Arab/ West Asian	1 (4.3)	0 (0)
Highest Education - Frequency (%)		
High School Diploma	2 (8.6) [a]	6 (2.5) [a]
College Diploma	2 (13.0) [a]	10 (41.7) [a]
Bachelor's Degree	6 (26.0) [a]	3 (12.5) [a]
Master's Degree	3 (13.0)[a]	2 (8.3)[a]

Doctorate Degree	1 (4.3)[a]	1 (4.2)[a]
Employment Status - Frequency (%)		
Unemployed	7 (30.4)	7 (30.4)
Employed part-time	10 (43.5)	9 (37.5)
Employed full-time	6 (26.1)	8 (33.3)
Marital Status - Frequency (%)		
Single	12 (52.1)	14 (60.9)[b]
Married	7 (30.4)	6 (2.5)[b]
Divorced/Widowed	4 (17.4)	3 (12.5)[b]
Additional diagnoses		
Met for a Mood Disorder	11 (47.8)	9 (37.5)
Met for an Additional Anxiety Disorder	13 (56.5)	9 (37.5)

Note. [a] item was only applicable to participants not currently enrolled in an education program (*n* = 36; 14 in the concrete training condition, 22 in the abstract training condition). [b] data was missing from 1 participant (*n* = 23).

Materials

The *MINI Screen* (Sheehan et al., 1998) is a preliminary screen for the *Mini International Neuropsychiatric Interview* (MINI; see below). Positive responses to the screening questions require the interviewer to complete the corresponding module in the MINI Interview. The *Mini Screen* has high internal consistency ($\alpha = .92$). The screening questions range from 63% to 82% on sensitivity and 61% to 83% on specificity. The overall accuracy of the questions ranges from 70% to 75% (Alexander, Haugland, Lin, Bertollo, & McCorry, 2008).

The *Mini International Neuropsychiatric Interview* (MINI; Sheehan et al., 1998), is a brief semistructured diagnostic interview that is used to assess Axis I disorders. The MINI has good test-retest reliability for GAD ($k = .78$) and high diagnostic specificity and sensitivity, of 86% and 91%, respectively (Sheehan et al., 1997). The MINI has high concordance rates with the *Structured Clinical Interview for the DSM-IV* ($k = .70$; Sheehan et al., 1997), which is a "gold standard" diagnostic measure, but was not used in this study due to time constraints.

The *Generalized Anxiety Disorder Questionnaire-IV* (GAD-Q-IV; Newman et al., 2002) is a 9-item self-report measure that assesses the DSM-IV diagnostic criteria for GAD, including the presence and interference of worry and associated features. The total score ranges from 0 to 13, with a cut score of 5.7 representing 89% specificity and 83% sensitivity for differentiating between individuals with GAD and individuals who do not have GAD. The GAD-Q-IV has good convergent validity with the *Anxiety Disorders Interview Schedule for DSM-IV* ($k = .67$) indicating that 88% of participants are accurately classified as having GAD using the GAD-Q-IV. As well, the GAD-Q-IV has good test–retest reliability ($r = .84$) over a 2-week period (Newman et al., 2002). A recent review examining the psychometric properties across four ethnocultural groups (African American, Caucasian, Hispanic/Latino, and Asian) yielded high

convergent validity with the PSWQ and the *Intolerance of Uncertainty Scale* and good discriminant validity when compared with the *Beck Depression Inventory-II* (Robinson, Klenck & Norton, 2011).

The *Center for Epidemiological Studies-Depression Scale* (CES-D; Radloff, 1977) is a 20-item measure of depressive symptoms experienced in the previous 7 days. Examples of items include "I was bothered by things that don't usually bother me" and "I thought my life has been a failure." Items are rated on a 4-point scale (0 = *rarely* to 3 = *most or all of the time*). The CES-D is a nondiagnostic measure and is intended for use in nonclinical populations. High internal consistency, good test-retest reliability, and good concurrent and construct validity have been demonstrated with the CES-D (Radloff, 1977).

The *Negative Problem Orientation Questionnaire* (NPOQ; Robichaud & Dugas, 2005a) contains 12 items that assess the extent to which the respondent sees problems as a threat, doubts his or her own problem-solving ability, and is pessimistic about the outcome of a problem. Items include, "I see problems as a threat to my well-being," "I often doubt my capacity to solve problems," and "My problems seem insurmountable." Items are rated on a 5-point scale (1 = *not at all true of me* to 5 = *extremely true of me*). The NPOQ demonstrates strong internal consistency ($\alpha = .91$), and good convergent and discriminant validity (Robichaud & Dugas, 2005b).

The *Social Problem Solving Inventory – Revised – Short Form* (SPSI-R-SF; D'Zurilla, Nezu, & Maydeu-Olivares, 2001) is a short-form of the SPSI-R and contains 25 items that measure problem-solving ability. The total score represents global problem-solving ability. In addition, the scale contains five subscales: negative problem orientation, positive problem orientation and three different problem-solving styles (rational problem solving style,

impulsivity/carelessness style and avoidance style). Individuals are instructed to indicate on a 5-point scale how true the statement is of them (1 = *not at all true of me* to 5 = *extremely true of me*). An example item is, "I feel threatened and afraid when I have an important problem to solve." Across the five scales, there is strong internal consistency with a range from α = .74 to .85, as well as good test–retest reliability ranging from .72 to .88 (D'Zurilla et al., 2001). For the present study, the negative problem orientation subscale was not analysed, as the NPOQ is a more comprehensive measure of negative problem orientation.

The *Penn State Worry Questionnaire* (PSWQ; Meyer et al., 1990) contains 16 items that assess the tendency to worry excessively and the controllability of worry (e.g., "Once I start worrying I can't stop"). Each item is rated on a 5-point scale (1 = *not at all typical of me* to 5 = *very typical of me*) and items are summed for a total score, with higher scores indicating greater worry levels. The PSWQ has demonstrated high internal consistency in clinical populations (α = .88 to .95) and good test-retest reliability after 2 and 10 weeks, r = .74 and r = .92 respectively (Molina & Borkovec, 1994).

The *Penn State Worry Questionnaire – Past Week* (PSWQ-PW; Stöber & Bittencourt, 1998) is a 15-item measure that assesses state worry over a 1-week period. Adapted from the PSWQ (Meyer et al., 1990), the PSWQ-PW is a change-sensitive, "state" measure of worry. Each item is rated on a 7-point scale (0 = *never* to 6 = *almost always*) and items are summed for a total score, with higher scores indicating greater level of worry over a 1-week period. Overall the PSWQ-PW has high internal consistency (α =.91) and moderate convergent validity with the original PSWQ. Overall, the PSWQ-PW is useful for monitoring worry status over a 1-week period (Stöber & Bittencourt, 1998).

Processing style training task. A modified version of Watkins et al.'s (2008) processing

style training task was used in the current study to train abstract and concrete processing styles in individuals with GAD. The training task contains 30 written scenarios (15 positive and 15 negative) that describe a variety of social, interpersonal, academic, and employment situations. The inclusion of a variety of positive and negative scenarios was to ensure that the processing style training would be manipulating the form of the thought and not its content or valence. Moreover, a balance of negative and positive scenarios also ensured that the training task did not manipulate mood. The scenarios were presented in a pseudorandom order, with one requirement that there were no more than three of the same valenced scenarios presented consecutively (Watkins et al., 2008). An example of a negative scenario is as follows:

> You have recently started a new job. Although you have tried very hard to be friendly and polite to your new colleagues, they do not make any effort to include you in conversation. Today you overhear them making arrangements to socialise after work, but they do not invite you along.

An example of a positive scenario is as follows:

> You go for a job interview. You are well prepared and able to answer the questions competently. The interview panel is friendly and encouraging, and you leave feeling very confident that you performed well enough to secure the position.

During the training task, the experimenter (EJP) read the 30 scenarios aloud while the participant read from a cue card. Following each scenario the participant was asked to spend 1 minute concentrating on each event as instructed. The instructions for participants in the abstract training condition were as follows:

> I would now like you to spend a minute concentrating on this event. Specifically, I would like you to think about what could happen next as a result of this event. Then, I

would like you to think about all the other possible things that could happen after that. As mentioned previously, in Watkins and colleagues' (2008) training task, participants focused on "why the event happened and the causes, meanings, and implications." For the present study, the task's instructions were modified to be future-oriented and less self-focused, to reflect the hypothesized thought process of individuals who worry excessively (Watkins et al., 2005). Participants in the concrete training condition were instructed as follows:

> I would now like you to spend a minute concentrating on this event. Specifically, I would like you to focus on the event as if it is happening right here and now, and try to imagine in your mind as vividly and concretely as possible a 'movie' of how this event is unfolding.

In Watkins and colleagues' original training task, participants focused on "how an event happened." For the present study, the task's instructions were modified to have participants imagine the event happening in the present-moment. The temporal orientation of the instruction was modified to be more reflective of concrete processing style (i.e., near-future and detailed; Trope & Liberman, 2010).

Prior to the training trials, participants performed a practice trial that required participants to describe to the experimenter what they had thought about during the 1 minute. This was done to ensure that participants had understood the task's instructions and were adopting the assigned processing style. Participants were given feedback on the practice trial until the task was executed correctly, after which they moved on to the training trials. After the initial practice trial, participants did not describe the content of their thought processes during the 1 minute thought period following each scenario.

Mood and Anxiety Visual Analogue Scale (VAS). In keeping with Watkins and

colleagues (2008), participants provided a mood rating on a VAS to ensure that the training did not induce a positive or negative mood. The mood rating ranged from 0 (*negative*) to 100 (*positive*). In addition, participants were instructed to rate their level of anxiety on a VAS that ranged from 0 (*not at all anxious*) to 100 (*very anxious*).

Manipulation check. To determine whether the processing style training task was successful in inducing either concrete or abstract processing, participants were presented with scenarios from the *Means-Ends Problem-Solving* task (MEPS; Platt & Spivack, 1975) and were asked to generate an ideal strategy for overcoming the problem (Watkins et al., 2008). For the present study, participants completed three MEPS scenarios: one at pretraining (preMEPS), the second at posttraining (postMEPS) and the third at follow-up (follow-up MEPS).

Two independent judges, blind to training condition, rated the MEPS scenarios using Stöber's *Concreteness Rating Scale*. The rating scale has five categories: 1 = *abstract*, 2 = *somewhat abstract*, 3 = *neither abstract nor concrete*, 4 = *somewhat concrete* and 5 = *concrete*. Stöber defined abstract thoughts as "indistinct, cross-situational, equivocal, unclear, aggregated," and defined concrete thoughts as "distinct, situationally specific, unequivocal, clear, singular (Stöber & Borkovec, 2002, p. 92)." Intraclass correlations (ICC) were calculated using a mixed design with raters as fixed factors and their ratings as random factors, with an absolute agreement between the two raters (McGraw & Wong, 1996; Shrout & Fleiss, 1979). The reliability of the raters' original ratings was good for the MEPS scenarios at pretraining (ICC = .74), posttraining (ICC = .76) and follow-up (ICC = .79). The two raters discussed individual ratings to determine a consensus score for each participant, which was used for all data analyses.

In addition, two independent judges who were blind to participant condition rated the level of effectiveness for each MEPS scenario solution. The raters used a 7-point scale to rate

level of effectiveness (1 = *not at all effective* to 7 = *extremely effective*; Watkins et al., 2008). Averaged ICCs were calculated to determine interrater reliability of level of effectiveness. The reliability of the raters' original ratings was good for the MEPS scenarios at pretraining (ICC = .83), posttraining (ICC = .84) and follow-up (ICC = .81). The two raters discussed individual ratings to determine a consensus score for each participant, which was used for all data analyses.

Interpretation bias task. To measure interpretive bias, three equivalent versions of the extended version of the *Ambiguous/Unambiguous Situations Diary* (AUSD-EX; Koerner and Dugas, 2008) were developed. The AUSD-EX, originally adapted from the *Ambiguous/Unambiguous Situations Diary* (AUSD; Davey, Hampton, Farrell, & Davidson, 1992), has a total of 55 items across eleven worry themes and three scenario types (positive, negative, and ambiguous). Participants are instructed to imagine that the scenario was happening to them personally. Participants responded on a 5-point scale to reflect how much concern they would experience as a result of the scenario (1 = *not at all concerned* to 5 = *very concerned*).

To develop three equivalent versions of the AUSD-EX, additional scenarios were written for eight worry themes chosen from the original eleven themes (i.e., social relationships, intimate relationships, family relationships, academic performance, work competence, financial, health, and threat of physical harm or danger). One positive scenario, one negative scenario, and two ambiguous scenarios were written for each theme, for a total of 32 different scenarios per version.

To determine the reliability of the three alternate versions, the three AUSD-EX versions were administered to 76 undergraduate students. To assess for valence, participants rated each item on a 9-point scale of pleasantness (1 = *not at all pleasant* to 9 = *very pleasant*). In addition, to assess for the level of ambiguity, participants rated each item on a 9-point scale of ambiguity

(1 = *not at all ambiguous* to 9 = *very ambiguous*). Analyses were conducted to determine if (1) the three scenario types differed on valence and level of ambiguity, and (2) each scenario type had a consistent valence and level of ambiguity across the three AUSD-EX versions. Mean scores and standard deviations for valence and ambiguity are reported in Table 2.

Valence. A 3 (scenario type: positive, negative, ambiguous) x 3 (AUSD-EX version: pre, post, follow-up) mixed analysis of variance (ANOVA) was conducted. An alpha level of .05 was set for statistical significance and a Bonferroni correction applied to all pairwise comparisons. For positive scenarios, mean scores of pleasantness did not differ across the three AUSD-EX versions, $F(2,73) = .70$, $p = .50$, partial $\eta^2 = .02$. For negative scenarios, mean scores of pleasantness did not differ across the three AUSD-EX versions, $F(2,73) = .01$, $p = .99$, partial $\eta^2 = .00$. For ambiguous scenarios, mean scores of pleasantness did not differ across the three AUDS-EX versions, $F(2,73) = .61$, $p = .50$, partial $\eta^2 = .02$. To ensure that there was a consistent valence score for each scenario type, the tests of simple effects were followed up with a series of pairwise comparisons for each scenario type that compared the valence score between AUSD-EX versions. The analyses yielded no significant pairwise comparisons: (1) no differences between AUSD-EX versions in the valence of positive scenarios; (2) no differences between AUSD-EX versions in the valence of negative scenarios; and (3) no differences between AUSD-EX versions in the valence of ambiguous scenarios (all *p*s > .05).

In addition, tests of simple effects of scenario type were conducted to determine the difference in valence scores between each scenario type within each AUSD-EX version. In the preAUSD-EX version, positive scenarios were rated as most pleasant compared to ambiguous scenarios, $t(24) = 26.65$, $p < .01$, $r = .98$, and negative scenarios, $t(24) = 16.66$, $p < .01$, $r = .96$.

Table 2

Mean Valence and Ambiguity Ratings for the AUSD-EX Versions

	PreAUSD-EX		PostAUSD-EX		Follow-up AUSD-EX	
	n = 25		*n* = 27		*n* = 24	
	M	*SD*	*M*	*SD*	*M*	*SD*
Valence						
Positive	8.09	.10	8.12	.14	7.92	.13
Negative	1.84	.19	1.86	.18	1.85	.20
Ambiguous	4.61	.16	4.78	.16	4.36	.15
Ambiguity						
Positive	2.59	.29	2.68	.32	2.72	.37
Negative	3.16	.34	3.05	.36	3.48	.36
Ambiguous	6.16	.33	6.30	.34	6.47	.29

Note. AUSD-EX = Ambiguous/Unambiguous Situations Diary. Valence items were rated on a 9-point scale (1 = *not at all pleasant*, 9 = *very pleasant*). Ambiguous items were rated on a 9-point scale (1 = *not at all ambiguous*, 9 = *very ambiguous*).

Ambiguous scenarios were rated as more pleasant than negative scenarios, $t(24) = 15.27$, $p < .01$, $r = .95$. In the postAUSD-EX version, positive scenarios were rated as the most pleasant as compared to ambiguous scenarios, $t(26) = 17.07$ $p < .01$, $r = .96$, and negative scenarios, $t(26) = 24.62$ $p < .01$, $r = .98$. Ambiguous scenarios were rated as more pleasant than negative scenarios, $t(26) = 12.91$, $p < .01$, $r = .93$. In the follow-up AUSD-EX version, positive scenarios were rated as the most pleasant as compared to ambiguous scenarios, $t(23) = 22.58$, $p < .01$, $r = .98$, and negative scenarios, $t(23) = 15.99$, $p < .01$, $r = .96$. Ambiguous scenarios were rated as more pleasant than negative scenarios, $t(23) = 13.50$, $p < .01$, $r = .94$. Overall, there was a consistent valence pattern within each AUSD-EX version: positive scenarios were rated as more pleasant than ambiguous scenarios and negative scenarios, and ambiguous scenarios were rated as more pleasant than negative scenarios.

Ambiguity. A 3 (scenario type: positive, negative, ambiguous) x 3 (AUSD-EX version: pre, post, follow-up) mixed ANOVA was conducted to determine whether (1) the three scenario types differed on level of ambiguity within each form, and (2) whether each item scenario type was equivalent across the three forms. Similar to the valence, simple effects were the focus of this analysis. Test of simple effects indicated that for positive scenarios there was no difference in mean scores of ambiguity across the three forms, $F(2,73) = 0.05$, $p = .95$, partial $\eta^2 = .01$. For negative scenarios, there was no difference in mean scores of ambiguity across the three versions, $F(2,75) = 0.40$, $p = .68$, partial $\eta^2 = .01$. For ambiguous scenarios, there was no difference in mean ratings of ambiguity across the three versions, $F(2,75) = 0.25$, $p = .78$, partial $\eta^2 = .01$. To ensure that there was a consistent ambiguity score for each scenario type, the tests of simple effects were followed up with a series of pairwise comparisons for each scenario type that compared the ambiguity score between AUSD-EX versions. The analyses yielded no significant

pairwise comparisons: (1) no difference in ambiguity of positive scenarios between AUSD-EX versions (2) no difference in ambiguity of negative scenarios between AUSD-EX versions and (3) no difference in ambiguity of ambiguous scenarios between AUSD-EX versions (all *p*s > .05).

In addition, tests of simple effects of scenario type were conducted to determine the difference in ambiguity scores between each scenario type within each AUSD-EX version. Pairwise comparisons revealed that within the preAUSD-EX version, ambiguous scenarios were rated as the most ambiguous, compared to positive, $t(24) = 11.18$ $p < .001$, $r = .92$, and negative scenarios, $t(24) = 9.05$, $p < .01$, $r = .84$. Negative scenarios were rated as more ambiguous than positive scenarios, $t(24) = 2.85$, $p < .01$, $r = .50$. In the postAUSD-EX version, ambiguous scenarios were rated as the most ambiguous, compared to positive, $t(26) = 8.63$, $p < .01$, $r = .86$ and negative scenarios $t(26) = 7.80$, $p < .01$, $r = .84$. Positive and negative scenarios did not differ on level of ambiguity, $t(26) = 1.12$, $p = .28$, $r = .21$. In the follow-up AUSD-EX version, ambiguous scenarios were rated as the most ambiguous, compared to positive scenarios, $t(23) = 7.28$, $p < .01$, $r = .98$, and negative scenarios, $t(23) = 6.10$, $p < .01$, $r = .79$. Positive and negative scenarios did not differ on level of ambiguity, $t(23) = 1.63$, $p = .12$, $r = .32$. Overall, the three AUSD-EX versions developed had a consistent pattern of ambiguity: ambiguous scenarios were rated as the most ambiguous compared to positive and negative scenarios. For post and follow-up AUSD-EX, positive and negative scenarios were equivalent on level of ambiguity. However, for the preAUSD-EX version, negative scenarios were rated as slightly more ambiguous than positive scenarios (*M difference* = 0.57).

Taken together, the results of the pilot study indicate that the three AUSD-EX versions developed for the present study were well matched on valence and ambiguity of positive,

negative, and ambiguous scenarios. The results also suggest that student raters perceived the positive, negative, and ambiguous scenarios as such.

Real-Life Problem-Solving Task. The Real-Life Problem-Solving Task was adapted from Anderson, Goddard, and Powell (2009), and required participants to answer questions about a personal problem they faced during the week between Session 1 and Session 2. A problem was defined as a situation that presents difficulty, and for which the solution is not immediately obvious. In this task, participants were instructed to (1) outline features of the problem situation; (2) answer 4 items derived from the NPOQ (Robichaud & Dugas, 2005a) to assess their degree of negative problem orientation toward the problem on a 5-point scale (1 = *not at all true of me* to 5 = *extremely true of me*); (3) explain the steps they took to solve the problem; and (4) indicate, based on their opinion, how effective their solution was on a 7-point scale (1 = *not at all effective* to 7 = *extremely effective*). The questions from the NPOQ were re-written to pertain to the problem participants were asked to describe. The four items were: "I had doubt about my capacity to solve the problem," "My problem seemed insurmountable," "When I attempted to solve the problem, I questioned my abilities," and "I had the impression that my problem could not be solved." The 4 items were selected because they loaded highest on the one-factor solution of the NPOQ (Item loadings ranged from .73 to .79; Robichaud & Dugas, 2005a).

Daily Mood and Worry Record. All participants were asked to keep a daily mood and worry record for 7 days between Session 1 and Session 2. The questions and format were adapted from Craske and Barlow (2006) and Brosschot and Van Der Doef (2006). Participants reported on the frequency and duration of worry episodes each day. In addition, participants provided daily ratings on a scale from 0 (*none*) to 100 (*extreme*) to indicate their overall and maximum level of anxiety, level of physical tension and overall preoccupation with worry.

Procedure

Telephone screen. Potential participants completed a telephone screen that consisted of the MINI screen, the MINI interview, and questions about current medication and psychotherapy. Eligible participants were invited to the Psychology Research and Training Centre at Ryerson University. Each participant was tested individually.

Session 1. Written informed consent was obtained from each participant. Following consent, participants gave an initial mood and anxiety VAS rating and completed the battery of questionnaires, including a demographics questionnaire, the GAD-Q-IV and a questionnaire battery containing the NPOQ, SPSI-R-SF, PSWQ, PSWQ-PW, and CES-D. Participants then completed the preAUSD-EX and preMEPS. Participants then provided a second mood and anxiety VAS rating and were randomly assigned to one of two conditions: abstract training or concrete training. Following training, participants provided a third mood and anxiety VAS rating and then completed postMEPS and the postAUSD-EX.

At the end of Session 1, participants were given instructions for completing the Real-Life Problem-Solving Task and the Daily Mood and Worry Record. Participants were compensated $15 for completion of Session 1 and Session 2 was scheduled for 1 week later.

Session 2. Participants returned the Real-life Problem-Solving task and Daily Mood and Worry Record and completed the questionnaire battery identical to Session 1, the follow-up AUSD-EX, and the follow-up MEPS. At the end of Session 2, participants were fully debriefed on the objectives, hypotheses, and implications of the study. Participants were given $15 for the completion of Session 2. See Appendix for the Informed Consent Agreement and Debriefing form.

Results

Preliminary Analyses

Data screening. A screen for outliers (i.e., values outside the range of an absolute *z*-score of 3.33; Tabachnick & Fidell, 2007) identified two values as extreme outliers. Tabachnick and Fidell's methodology for recoding outliers as the next extreme value was used to ensure that the participant remained in his or her original position within the distribution of scores. Tests of normality indicated that the data approximated the normal distribution, and due to the robustness of the statistical tests used (*t*-test and ANOVA) to account for violations of normality (Leech, Barrett, & Morgan, 2008), the data were not transformed. Missing values within questionnaires were replaced by the participant's mean score on the questionnaire and then added to the total score. This method of replacement is sufficient when less than 5% of the data are missing (Tabachnick & Fidell, 2007). Analyses were conducted with the entire sample (N = 47) unless there were missing participants due to either incomplete questionnaires or poor adherence to study instructions (e.g., did not complete the problem solving task correctly). The following questionnaires had missing participant data: preMEPS concreteness rating (n = 1), postMEPS concreteness rating (n = 2), follow-up MEPS concreteness rating (n = 3), postMEPS effectiveness rating (n = 2), follow-up MEPS effectiveness rating (n = 4), pretraining CES-D (n = 1), Real-Life Problem Solving Task (n = 3), and the Mood and Worry Record (n = 7). Finally, two participants did not complete the initial VAS rating because this administration was added to procedure after the participants had completed the study.

Pretraining differences. To ensure that participants in the abstract training condition and the concrete training condition were equivalent on all measures at pretraining, independent samples *t*-tests (see Table 3) were performed comparing scores on the GAD-Q-IV, NPOQ,

Table 3

Pretraining Differences on Study Measures Separated by Training Condition

	Concrete Training		Abstract Training					
Measure	Mean	SD	Mean	SD	*t*	*df*	*p*	*r*
GAD-Q-IV	9.98	2.31	10.05	2.10	.11	45	.92	.02
CES-D	25.30	12.86	26.96	17.79	.40	44	.67	.05
PreMEPS Concreteness	3.13	.69	2.74	.81	1.76	44	.09	.25
Interpretation Bias								
PreAUSD-EX								
Ambiguous Scenarios	3.17	.57	3.47	.62	1.68	45	.10	.24
Positive Scenarios	2.08	.84	2.07	.87	.06	45	.97	.01
Negative Scenarios	4.18	.50	4.29	.47	.75	45	.46	.11
Problem Solving								
NPOQ	38.04	8.71	38.63	11.71	.19	42.44	.85	.08
SPSI-R-SF	51.26	15.34	52.29	14.61	.24	45	.82	.03
PreMEPS Effectiveness	4.00	1.01	3.63	1.41	1.02	45	.31	.15

	Worry								
PSWQ		64.48	8.23	67.81	8.05	1.41	45	.17	.20
PSWQ-PW		63.14	16.82	66.96	14.98	.82	45	.42	.12
	State Mood and Anxiety Level								
Mood and Anxiety VAS		57.51	22.85	49.79	19.95	1.21	43	.24	.18

Note. GAD-Q-IV = Generalized Anxiety Disorder Questionnaire – IV; CES-D = Centre for Epidemiological Studies – Depression Scale; PreMEPS concreteness = Concreteness rating for pretraining Means-Ends Problem Solving Task; PreAUSD-EX = Pretraining Ambiguous/ Unambiguous Situations Diary; NPOQ = Negative Problem Orientation Questionnaire; SPSI-R-SF: Social Problem Solving Inventory – Revised- Short Form; PreMEPS effectiveness = Effectiveness rating for pretraining Means-Ends Problem Solving Task; PSWQ = Penn State Worry Questionnaire; PSWQ-PW = Penn State Worry Questionnaire- Past Week.

SPSI-R-SF, PSWQ, PSWQ-PW, CES-D, Mood and Anxiety VAS, PreMEPS concreteness and effectiveness rating and preAUSD-EX. An alpha level of .05 was used for all statistical tests. The analyses yielded no pretraining differences between the two training conditions on any dependent measures.

Hypothesis 1 - Preliminary Relationship of Concreteness

To examine the first hypothesis that reduced concreteness on the preMEPS would be associated with the study variables, Pearson product moment correlations were computed in the total, undifferentiated sample (see Table 4). There was no relationship found between that concreteness scores and GAD symptoms (based on the GAD-Q-IV). Lower concreteness scores were associated with appraisals of ambiguous and positive scenarios as more disconcerting, lower negative problem orientation, a greater avoidance of problem solving, and problem solutions that were rated as less effective. Reduced concreteness scores were associated with a greater tendency to worry in the past week, but was not associated with their general tendency to worry. Finally, reduced concreteness scores on the MEPS were associated with greater depression symptoms.

Effect of Cognitive Processing Style Training on Mood and Anxiety

Two 2 (training condition: abstract, concrete) x 3 (baseline, pretraining, posttraining) mixed ANOVAs were performed on mood and anxiety VAS ratings. There were no significant main effects or Training Condition x Time interactions for mood and anxiety VAS ratings. This suggests that the processing style training task did not induce a negative or positive mood, and did not influence reported level of anxiety.

Table 4

Zero-order Correlations between Pretraining Level of Concreteness and Outcome Measures

Measure	PreMEPS - Concreteness
GAD-Q-IV	-.08
CES-D	-.46**
	Interpretive Bias
AUSD-EX	
Positive Scenarios	-.53**
Negative Scenarios	-.15
Ambiguous Scenarios	-.47**
	Problem Solving
NPOQ	-.34*
SPSI-R-SF	.22
PPO	-.04
RPS	-.20
ICS	-.29
AS	-.30*
PreMEPS Effectiveness	.54**
	Worry
PSWQ	-.24
PSWQ-PW	-.36*

Note. GAD-Q-IV = Generalized Anxiety Disorder Questionnaire – IV; CES-D = Centre for

Epidemiological Studies – Depression Scale; AUSD-EX = Ambiguous/Unambiguous Situations Diary; NPOQ = Negative Problem Orientation Questionnaire; SPSI-R: Social Problem Solving Inventory – Revised; PPO: Problem Solving Orientation Subscale; RPS = Rational Problem Solving Subscale; ICS = Impulsive/Carelessness Subscale; AS = Avoidant Style Subscale; PreMEPS – Effectiveness = Effectiveness Rating for Pretraining Means-Ends Problem-Solving Task; PSWQ = Penn State Worry Questionnaire; PSWQ-PW = Penn State Worry Questionnaire – Past Week. Level of concreteness is measured on a 5-point scale (1 = *abstract*, 5 = *concrete*). *$p < .05$. ** $p < .01$.

Hypothesis 2: Impact of Training on Concreteness

It was hypothesized that cognitive processing style in individuals with GAD could be manipulated to be more abstract or concrete. To determine whether the processing style training task had the intended effect of inducing concrete or abstract processing, an independent samples *t*-test was performed to compare the two training conditions on the postMEPS concreteness ratings. The analysis indicated that at posttraining, participants in the concrete training condition (M =3.48, SD = .69) produced problem solutions that were rated as more concrete compared to problem solutions produced by participants in the abstract training condition (M = 2.74, SD = .81), $t(42) = 3.25$, $p < .01$, $r = .44$. Therefore, the experimental manipulation was successful and was associated with a medium-size effect (Cohen, 1977).

To determine whether the training effects endured, an independent samples *t*-test was conducted to compare the training conditions on the follow-up MEPS concreteness ratings. The analysis indicated that the training effect was not maintained at session 2. The problem solutions developed by participants in the concrete training condition (M = 3.05, SD = .87) were not rated as significantly more concrete than those of participants in the abstract training condition (M = 2.96, SD = .83), $t(42) = .36$, $p = .72$, $r = .05$.

Hypothesis 3 – Impact of Training on Interpretive Bias

It was hypothesized that compared with participants in the abstract training condition, participants in the concrete training condition would appraise positive, negative, and ambiguous situations less negatively at posttraining and follow-up (Session 2), and that the between-group differences would be most pronounced for ambiguous situations. Separate analyses were performed for each scenario type across time (pretraining, posttraining, and follow-up). An alpha level of .05 was set for statistical significance and a Bonferroni correction was applied to all

follow-up tests of main effects and interactions. Regardless of whether the omnibus effects were significant, all analyses were followed up with tests of simple effects to examine study hypotheses that stated specific predictions for change and differences between the two training conditions. For means and standard deviations of level of concern for positive, negative and ambiguous scenarios see Table 5.

Interpretations of positive scenarios. To examine the impact of training on appraisals of positive scenarios, a 2 (training condition: abstract, concrete) x 3 (time: pretraining, posttraining, follow-up) mixed ANOVA was conducted on scores on the AUSD-EX. The analysis yielded a significant main effect of time, $F(2, 90) = 4.66$, $p = .01$, partial $\eta^2 = .09$, but no main effect of training condition or Training Condition x Time interaction.

Follow-up tests of simple effects with Bonferroni correction revealed that participants, irrespective of condition assignment, reported decreased concern for positive scenarios from pretraining to posttraining, $F(1, 45) = 7.64$, $p = .01$, partial $\eta^2 = .14$, however, reported increased concern from posttraining to follow-up, $F(1, 45) = 6.95$, $p = .01$, partial $\eta^2 = .13$.

Interpretations of negative scenarios. To examine the impact of training on appraisal of negative scenarios, a 2 (training condition: abstract, concrete) x 3 (time: pretraining, posttraining and follow-up) mixed ANOVA was performed on scores on the AUSD-EX. The analysis yielded no main effects or Training Condition x Time interaction. In addition, follow-up tests of simple effects yielded no significant findings.

Interpretations of ambiguous scenarios. To examine the impact of training on the interpretation of ambiguous scenarios, a 2 (training condition: abstract, concrete) x 3 (time: pretraining, posttraining, follow-up) mixed ANOVA was conducted on scores on the AUSD-EX.

Table 5

Level of Concern Ratings for AUSD-EX Scenarios Separated by Training Condition

	Concrete Training		Abstract Training		All Participants	
Scenario Type	M	SD	M	SD	M	SD
Positive Scenarios						
Pretraining	2.08	.84	2.07	.87	2.07	.85
Posttraining	1.88	.99	1.93	.97	1.91	.97
Follow-up	2.08	.97	2.10	.94	2.09	.94
Average	2.01	.88	2.03	.90		
Negative Scenarios						
Pretraining	4.18	.50	4.29	.47	4.24	.48
Posttraining	4.15	.54	4.31	.49	4.24	.52
Follow-up	4.17	.51	4.28	.48	4.23	.49
Average	4.17	.47	4.29	.42		
Ambiguous Scenarios						
Pretraining	3.17	.57	3.47	.62	3.32	.61
Posttraining	3.00	.72	3.50	.76	3.26	.78
Follow-up	3.28	.63	3.56	.79	3.43	.73
Average	3.15	.57	3.51	.70		

Note. AUSD-EX = Ambiguous/Unambiguous Situations Diary. Level of concern rated on a scale from 1 (*not at all concerned*) to 5 (*very concerned*).

Mauchly's test indicated that the assumption of sphericity had been violated, $X^2(2) = 6.42$ $p = .04$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity ($\varepsilon = .88$). The analysis yielded a significant main effect of time, $F(1.76, 79.24) = 3.60$,$p = .03$, partial $\eta^2 = .07$. Contrasts revealed that participants generally reported significantly less concern at posttraining compared to follow-up, $F(1, 45) = 8.07$, $p = .01$, partial $\eta^2 = .15$, but no difference between pretraining and posttraining. The main effect of training condition approached significance, $F(1, 45) = 3.62$, $p = .06$, partial $\eta^2 = .07$. There was no significant Training Condition x Time interaction.

Tests of simple effects of training condition within each level of time were performed to examine the hypothesis that at posttraining there would be a significant difference in reported level of concern for ambiguous scenarios. At posttraining, participants in the concrete training condition reported significantly less concern with ambiguous scenarios ($M = 3.00$, $SD = .72$) than did participants in the abstract training condition ($M = 3.50$, $SD = .76$), $t(45) = 2.28$, $p = .03$, $r = .32$. There was no difference between conditions at pretraining or follow-up. In addition, tests of simple effects of time within both training conditions were performed. In the concrete training condition, participants reported less negative appraisals of ambiguous scenarios at posttraining ($M = 3.00$, $SD = .72$) compared to their appraisals of ambiguous scenarios at follow-up ($M = 3.28$, $SD = .64$), $t(22) = 2.60$, $p = .02$, $r = .20$.

In addition, it was hypothesized that the greatest difference between training conditions would be found for ambiguous scenarios, compared to positive scenarios and negative scenarios. To test this hypothesis, effect sizes for between group differences for each scenario type were compared using a series of *z*-tests to compare non-independent correlation coefficients (training conditions coded as 1 = *concrete*, 2 = *abstract*; Meng, Rosenthal, & Rubin, 1992). At

posttraining, the between training conditions effect size for negative appraisals of positive, negative and ambiguous scenarios were r =.03, r = .16, and r = .32, respectively. Although the impact of training on interpretations of ambiguous scenarios appeared to be greater than the impact of training on interpretations of positive and negative scenarios, the effect sizes were not significantly different, z = 1.41, p =.08 and z = 0.80, p = .21, respectively. At follow-up, the between training conditions effect size for negative appraisals of positive, negative and ambiguous scenarios were r = .02, r = .11, and r = .19, respectively. There were no significant differences found between effect sizes for the impact of training on interpretations of ambiguous scenarios versus positive scenarios, and the impact of training on interpretations of ambiguous scenarios versus negative scenarios, z = 0.83, p =.20 and z = 0.38, p = .35, respectively.

Hypothesis 4 – Impact of Training on Problem Solving Related Constructs

Negative problem orientation. The fourth hypothesis stated that relative to participants assigned to the abstract training condition, individuals in the concrete training condition would report a greater improvement on negative problem orientation following training. A 2 (training condition: abstract, concrete) x 2 (time: pretraining and follow-up) ANOVA was conducted with scores on the NPOQ as the dependent variable. For means and standard deviations, see Table 6. The analysis yielded no significant main effects of training condition or time, and no significant Training Condition x Time interaction. In addition, follow-up tests of simple effects yielded no significant findings.

In addition, a series of independent samples *t*-tests were conducted to test between-group differences on the 4 negative problem orientation items from the personal problem solving task. The training conditions did not differ on their responses to any of the negative problem orientation items (All ps > .05; rs < .20).

Table 6

Means and Standard Deviations of Self-Report Outcome Measures Separated by Training Condition

	Concrete Training				Abstract Training			
	Pretraining		Posttraining		Pretraining		Posttraining	
Measure	Mean	SD	Mean	SD	Mean	SD	Mean	SD
NPOQ	38.04	8.71	37.52	9.40	38.63	11.70	37.88	13.17
SPSI-R-SF	51.26	15.24	52.43	14.81	52.29	14.61	50.67	17.20
PPO	15.39	3.96	16.52	3.42	15.73	4.18	15.29	4.27
RPS	17.00	3.86	16.87	3.79	16.87	4.52	15.92	4.23
ICS	11.52	5.53	11.78	5.43	11.47	3.87	11.96	3.64
AS	12.78	4.85	12.52	5.11	11.13	5.80	11.58	6.25
PSWQ	64.48	8.23	64.43	8.89	67.82	8.05	65.92	7.71
PSWQ-PW	63.14	16.82	62.69	14.19	66.96	14.98	67.38	11.92
CES-D	25.30	12.86	24.87	11.36	26.95	14.88	26.67	14.35

Note. NPOQ = Negative Problem Orientation Questionnaire; SPSI-R = Social Problem Solving Inventory – Revised; PPO = Problem Solving Orientation; RPS = Rational Problem Solving Subscale; ICS = Impulsive/Carelessness Subscale; AS = Avoidant Style Subscale; PSWQ = Penn State Worry Questionnaire; PSWQ-PW = Penn State Worry Questionnaire – Past Week; CES-D = Centre for Epidemiological Studies – Depression Scale.

Problem solving effectiveness. The fourth hypothesis stated that compared to participants in the abstract training condition, participants in the concrete training condition would produce effective solutions in a standard problem solving task (i.e., MEPS) following training. An independent samples *t*-test indicated that at posttraining, participants in the concrete training condition (M = 4.00, SD = 1.15) produced problem solutions that were rated as more effective than problem solutions produced by participants in the abstract training condition (M = 3.09, SD = 1.28), $t(43) = 2.51$, $p = .02$, $r = .35$. However, at follow-up, the between-group difference was no longer significant, even though the problem solutions produced by participants in the concrete training condition (M = 3.62, SD = 1.02) were rated as more effective than those of participants in the abstract training condition (M = 3.27, SD = 1.24), $t(41) = 1.00$, $p = .33$, $r = .15$.

In addition, an independent samples *t*-test was conducted to test between-group differences in self-rated problem-solving effectiveness, as assessed via the Real-Life Problem-Solving Task. Effectiveness scores in the concrete training condition ranged from 3 to 7, and effectiveness scores in the abstract training condition ranged from 1 to 7, on a 7-point scale (1 = *not at all effective* to 7 = *very effective*). There was no significant difference between participants in the concrete training condition (M = 5.55, SD = 1.05) and abstract training conditions (M = 5.26, SD = 1.65) on self-perceived problem solving effectiveness, $t(43) = .68$, $p = .50$, $r = .10$.

Finally, a series of 2 (training condition: abstract, concrete) x 2 (time: pretraining, follow-up) mixed ANOVAS were performed on the SPSI-R-SF subscales: Positive Problem Orientation, Rational Problem Solving Style, Impulsivity/Carelessness Style, and Avoidance Style. For means and standard deviations, see Table 6. The analyses yielded no significant main effects of training condition or time and no interaction on the SPSI-R-SF subscales. In addition, follow-up

tests of simple effects yielded no significant training effects (All *p*s > .05; *r*s < .16).

Hypothesis 5 - Impact of Training on Worry and Anxiety

It was hypothesized that compared to participants in the abstract training condition, participants in the concrete training condition would report a greater decrease in worry and anxiety following training. Two 2 (training condition: abstract, concrete) x 2 (time: pretraining and follow-up) mixed ANOVAs were conducted with trait worry (PSWQ) and state worry (PSWQ-PW) as the dependent variables. For means and standard deviations, see Table 6. The analysis yielded no significant main effect of time or training condition, and no significant Training Condition x Time interaction for either measure of worry. In addition, follow-up tests of simple effects yielded no significant findings (all *p*s > .05; *r*s < .18).

In addition to the Penn State measures of worry, participants' responses on the Daily Mood and Worry Record were examined between training conditions. A series of independent samples *t*-tests were conducted to compare the training conditions on number of worry episodes, total duration of worry, average and maximum anxiety level, amount of physical tension, preoccupation with worry on the day immediately following Session 1 and averaged over the 7 days between Session 1 and Session 2. None of the independent samples *t*-tests indicated a significant difference between the two training conditions (all *p*s > .05; *r*s < .27).

Depression as a Covariate

Depression symptoms had a significant relationship with participants' existing processing style at pretraining; therefore, it was important to identify whether depression could be a potential confounding variable in determining the direct influence of processing style training on GAD symptoms and cognitive processes. To test the relationship, Pearson product moment correlations were conducted with the total sample to examine the relationship of pretraining

depression symptoms (CES-D) to posttraining and follow-up ratings of concreteness, appraisals of positive, negative and ambiguous scenarios and ratings of problem solving effectiveness at posttraining and follow-up. In addition, the relationship of depression scores to posttraining negative problem orientation, problem solving style, and worry was examined. See Table 7 for correlations. Higher scores on the CES-D were associated with problem solutions that were rated as more abstract and greater negative appraisals of ambiguous and positive scenarios at posttraining and follow-up. In addition, higher depression scores were associated with greater negative problem orientation, less adaptive problem solving styles, and a greater tendency to worry. As a result, the hypotheses were retested using a series of analyses of covariance (ANCOVAs) with scores on the CES-D as a covariate.

Cognitive processing style. Results indicated that individuals in the concrete training condition still produced problem solutions on the MEPS that were rated as significantly more concrete than did individuals in the abstract training condition after controlling for depression, $F(1, 40) = 11.10$, $p < .01$, partial $\eta^2 = .22$. Therefore, after controlling for depression symptoms, the difference between training conditions at posttraining training remained significant. The non-significant difference between individuals trained on abstract or concrete processing style on MEPS concreteness ratings at follow-up was unchanged after controlling for depression symptoms.

Interpretation bias. For the positive scenarios, the main effect of time was no longer significant, $F(2, 86) = 2.06$, $p = .13$, partial $\eta^2 = .05$. For the ambiguous scenarios, the main effect of time was no longer significant, $F(2, 86) = 1.60$, $p = .21$, partial $\eta^2 = .04$. In addition, after controlling for depression symptoms, the posttraining difference between individuals trained on abstract processing style compared to concrete processing style on appraisals of

Table 7

Zero-Order Correlations between Pretraining Depression Scores and Outcome Measures

Measure	CES-D
Concreteness	
Post-MEPS	-.38*
Follow-up-MEPS	-.27
Interpretation Bias	
Post-AUSD-EX	
Ambiguous	.43**
Positive	.22
Negative	.13
Follow-up-AUSD-EX	
Ambiguous	.50**
Positive	.42**
Negative	.22
Problem Solving	
NPOQ	.71**
SPSI-R-SF	-.52**
PPO	-.30**
RPS	-.00
ICS	.37*
AS	.46**

Post MEPS – Effectiveness	-.17
Follow-up-MEPS – Effectiveness	-.29
Real Life Problem Solving - Effectiveness	-.05
Worry and Anxiety	
PSWQ	.48**
PSWQ – PW	.70**
Mood and Worry Record - Day 1 Posttraining	
Number of worry episodes	.07
Duration of worry episode	.04
Overall Anxiety	.41**
Maximum Anxiety	.35*
Overall Physical Tension	.34*
Overall Preoccupation with Worry	.47**
Mood and Worry Record - Average Worry Posttraining	
Number of worry episodes	.23
Duration of worry episode	.29
Overall Anxiety	.51**
Maximum Anxiety	.45**
Overall Physical Tension	.32*
Overall Preoccupation with Worry	.50**

Note. MEPS = Means-Ends Problem Solving Task; Post-AUSD-EX = Posttraining Ambiguous/ Unambiguous Situations Diary; Follow-up-AUSD-EX = Follow-up Ambiguous/Unambiguous Situations Diary; NPOQ = Negative Problem Orientation Questionnaire; SPSI-R-SF: Social

Problem Solving Inventory – Revised- Short Form; PPO: Problem Solving Orientation; RPS = Rational Problem Solving Subscale; ICS = Impulsive/Carelessness Subscale; AS = Avoidant Style Subscale; PSWQ = Penn State Worry Questionnaire, PSWQ-PW = Penn State Worry Questionnaire- Past Week.

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

ambiguous scenarios was no longer significant. Moreover, the remaining non-significant findings on the influence of processing style training on appraisals of positive, negative, and ambiguous scenarios were unchanged after controlling for depression symptoms.

Problem solving. The previous hypotheses examining problem solving orientation (NPOQ and Positive Problem Orientation) and problem solving styles (Impulsive/Careless and Avoidant Style) were retested with depression (CES-D) scores as a covariate. The non-significant main effects of time and training condition and Training Condition x Time interaction for problem solving measures were unchanged after controlling for depressions symptoms.

Worry. The previous analyses examining self-reported tendency to worry (PSWQ, PSWQ-PW) and anxiety levels associated with worry on the Mood and Anxiety Record were re-examined with depression (CES-D) scores as a covariate. The non-significant main effects of time and training condition and Training Condition x Time interaction for worry were unchanged after controlling for depressions symptoms.

Discussion

Purpose of the Study

The goals of the study were (1) to determine whether cognitive processing style training would be effective in inducing an abstract or a concrete cognitive processing style in individuals with GAD, and (2) to examine the influence of cognitive processing style training on GAD symptoms and related cognitive processes. Based on Stöber's theory of reduced concreteness it was hypothesized that there would be an existing relationship between an abstract processing style and GAD symptoms and related cognitive processes. In addition, it was hypothesized that compared to abstract processing style training, concrete processing style training would result appraisals of ambiguous, positive, and negative scenarios as less negative; reduced negative problem orientation and greater problem solving effectiveness; and a greater reduction in worry and anxiety in individuals with GAD.

Cognitive Processing Style

The first hypothesis that there would be an existing relationship between processing style (as assessed via the concreteness of problem solutions) and GAD symptoms and cognitive processes was partially supported. At pretraining, abstract processing style was associated with negative appraisals of ambiguous and positive scenarios, greater negative problem orientation, problem solving styles that are more maladaptive, and problem solutions of reduced effectiveness. Although abstract processing style was associated with a greater tendency to worry over the past week, there was no relationship between the concreteness of processing style and a tendency to worry in general. Moreover, there was no relationship between the level of concreteness of processing style and severity of GAD symptoms, as assessed by the GAD-Q-IV. However, abstract processing style was significantly associated with greater depression

symptoms, as assessed by the CES-D.

In addition, following processing style training, individuals with GAD who scored higher on a measure of depression symptoms formed problem solutions that were rated as more abstract, appraised ambiguous scenarios more negatively and had a greater negative problem orientation. Taken together, depression symptoms appeared to have a strong association with abstract processing style. Therefore, it was important to examine depression symptoms as a possible confounding factor in the effect of cognitive processing style training on GAD symptoms and related cognitive processes.

Cognitive Processing Style Training

The second hypothesis was supported. Training was successful in inducing abstract or concrete processing style in individuals with GAD, as determined by the level of concreteness ratings for problem solutions at posttraining. Based on the construal level theory (Trope & Liberman, 2010), the training task may have resulted in problem descriptions that were rated as more or less concrete via the manipulation of temporal orientation and the degree of detail of thoughts. In the present study, participants trained to adopt a concrete processing style thought about scenarios in a detailed and concrete manner, imagining that it was occurring in the present moment. Conversely, participants trained to adopt an abstract processing style thought about all of the events that could happen in the future as a result of the scenario. The results indicated that the processing style training was effective in inducing the intended processing style. Participants who were trained to adopt a concrete processing style produced problem descriptions that were rated as more concrete (i.e., more detailed and specific), compared to participants trained to adopt an abstract processing style, who produced problem descriptions that were rated as more abstract (i.e., lacking detail and vague). Moreover, the modified cognitive processing style

training task used in the present study had a comparable effect size (r = .44) to Watkins et al.'s (2008) original training task (r = .45), which was developed to induce a processing style similar to depressive rumination. Therefore, the modified training instructions did not appear to influence the robustness of the training task. Furthermore, after controlling for depression symptoms, the difference between training conditions on level of concreteness following processing style training remained significant. Therefore, despite the relationship between depression symptoms and processing style, depression symptoms were not accounting for the difference in concreteness of problem solutions at posttraining between the two training conditions. Taken together, processing style training was effective in inducing a shift in cognitive processing style; however, the durability of training was limited. At follow-up (i.e., 7 days posttraining), processing style training did not influence the concreteness of problem solutions.

Aside from the present study, there has been no direct examination of the durability of a one-session processing style training task beyond the training session (Watkins et al., 2008). The closest comparison is studies examining the durability of cognitive bias modification (CBM) training for interpretive biases, which have reported training effects up to 24 hours (e.g., Mackintosh, Mathews, Yiend, Ridgeway & Cook, 2006; Yiend, Mackintosh, & Mathews, 2005). However, whether the training task is *active* or *passive* can influence the durability of the training effect. Active tasks are associated with more durable and robust training effects compared to passive tasks (Hoppitt, Mathews, Yiend, & Mackintosh, 2010).

Based on Hoppitt and colleagues' (2010) definition of CBM tasks, the training task in the present study may fit the description of an *active* training task. Participants were required to expend cognitive effort by either thinking about events that could arise in the future (abstract

processing style) or imagining the event occurring in the present (concrete processing style). However, a limitation to the training task was that there was no assessment of whether participants were adhering to the training instructions throughout the duration of the training task. Therefore, participant fatigue or the activation of negative arousal from reading negative scenarios may have attenuated adherence to training instructions (Hoppitt et al., 2010). Consequently, the training task may have been more *passive* and less cognitively effortful than intended, which may have negatively influenced robustness and durability of processing style training. In addition, Watkins and colleagues (2008) also did not have a check of adherence to training instructions. Therefore, if adherence to training instruction was a factor in the durability of processing style training, perhaps the processing style training may have been more robust if participants had fully adhered to the training instructions. Future studies would benefit by including a check of adherence to training instructions following each training trial.

Influence of processing style on threatening appraisals. The third hypothesis was partially supported. Following concrete processing style training participants reported reduced concern for ambiguous scenarios compared to participants trained to adopt an abstract processing style. This finding is consistent with the pretraining relationship between abstract processing style and greater negative appraisals of ambiguous scenarios. At follow-up, however, there was no influence of processing style training on participants' appraisals of ambiguous scenarios. Again, the limited durability of processing style training must be taken into account when interpreting the null findings at follow-up. Taken together, it appears that processing style training had an immediate influence on appraisals of ambiguous scenarios; however, the effects were not durable.

Moreover, given the significant relationship between greater depression symptoms and

negative appraisals of ambiguous scenarios at posttraining, the third hypothesis was re-tested to control for the potential confound of depression symptoms. The analysis yielded a null association between processing style training and participants' negative appraisals of ambiguous scenarios after controlling for depression symptoms. Therefore, it appears that after controlling for the variance related to depression symptoms, there was no relationship between processing style training and interpretation bias in GAD.

Given that there was no difference between individuals trained to adopt a concrete or an abstract processing style on pretraining depression symptoms, controlling for depression symptoms should have removed variance that was unrelated to GAD (Miller & Chapman, 2001). However, depression symptoms commonly co-occur in GAD (Kessler et al., 2002) and were significantly related to GAD symptoms (GAD-Q-IV, $r = .54$, $p < .01$) and worry (PSWQ, $r = .58$, $p < .01$; PSWQ-PW, $r = .78$, $p < .01$) in the present study. Therefore, the variance removed while controlling for depression symptoms may have underestimated the influence of processing style training on interpretation bias in GAD. As a result, the interpretation of these findings should take into account that the remaining variance, after controlling for depression symptoms, may not represent the full construct of interpretation bias in GAD (Miller & Chapman, 2001).

Nevertheless, although controlling for depression symptoms may have reduced the variance between processing style training and interpretation bias in GAD, the results must be interpreted in light of the null association at pretraining between processing style and worry. Given that there was a significant relationship between processing style and depression symptoms at pretraining, it is likely that depression symptoms had a significant role in the influence of processing style training on individuals' negative appraisals of ambiguous scenarios.

In terms of appraisals of positive scenarios, it appears that cognitive processing style did

not have a significant role. At posttraining, irrespective of training condition, individuals reported reduced negative appraisals for positive scenarios compared to pretraining and follow-up. However, there was no difference found within each training condition from pretraining to posttraining, or posttraining to follow-up. Moreover, after controlling for depression symptoms, there was no difference found between pretraining, posttraining or follow-up on appraisals of positive scenarios. Therefore, it appears that processing style training did not influence appraisals of positive scenarios made by individuals with GAD.

In addition, in terms of appraisals of negative scenarios, it appears that cognitive processing style did not have a significant role. At posttraining and follow-up, there was no difference between individuals trained to adopt a concrete or abstract processing style on the appraisal negative scenarios. The lack of influence of processing style training on the appraisal of negative scenarios is consistent with the preliminary analysis that indicated there was no pretraining relationship between concreteness and threat interpretations of negative scenarios.

Influence of processing style on problem solving. The fourth hypothesis was partially supported. At posttraining, participants trained to adopt a concrete processing style developed problem solutions that were rated as more effective compared to participants trained to adopt an abstract processing style. The training effects were comparable to those reported by Watkins and Moulds (2005), who noted similar differences between the experimental conditions on ratings of the effectiveness of problem solutions in individuals with depression (r = .28). Moreover, the finding is consistent with Stöber's theory of reduced concreteness (1998), which suggests that greater concreteness of thought would lead to effective problem solutions via concrete problem definitions. At follow-up, however, there was no difference between training conditions on the effectiveness of problem solutions, but again the lack of training effect at follow-up may explain

this null finding.

The hypothesis that processing style training would influence negative problem orientation, positive problem orientation, and problem solving style was not supported. There was no difference between individuals trained to adopt an abstract or concrete processing style between pretraining and follow-up on problem solving measures. Given the significant pretraining relationship between abstract processing style and a greater negative problem orientation and greater avoidance of problem solving, the lack of processing style training effects at follow-up may have resulted in the null findings. A limitation to the study was the lack of measurement of negative problem orientation and problem solving style immediately following training. As a result, immediate changes in participants' negative beliefs about problem solving may have been present, but not assessed. However, it is unknown whether self-report measures would detect an immediate shift in these dispositional, trait-like attitudes. Furthermore, a one-session processing style training task may not shift individuals' stable beliefs about the problem solving process; however, there are no comparable studies examining the influence of a single session training task on negative problem orientation to be certain. Therefore, to understand whether negative problem orientation or problem solving styles can shift immediately following training, future studies could use implicit measures of cognitive processes (e.g., implicit association tasks) to detect any immediate shifts in problem solving beliefs and attitudes.

Finally, when participants were asked to report on their attempt to solve a personal problem during the 7 days between the two experimental sessions, there was no difference between the two training conditions on negative problem orientation or perceived effectiveness of their problem solution. Based on the average mean score of the four negative problem orientation items, participants trained to adopt either concrete (M = 3.03, SD = .88) or abstract

processing styles (*M* = 2.65, *SD* = .72) reported moderately negative beliefs in their ability to solve their personal problems on a 5-point scale (1 = *not at all true of me* to 5 = *extremely true of me*). In addition, irrespective of training condition, participants rated the solution they developed for their personal problem as moderately effective. Participants instructed to adopt a concrete processing style reported effectiveness scores (*M* = 5.55, *SD* = 1.06) that were similar to those of individuals trained to adopt an abstract processing style (*M* = 5.26, *SD* = 1.66) on a 7-point scale (1 = *not at all effective* to 7 = *extremely effective*). These findings suggest that although participants had a moderately negative attitude towards solving their personal problem, they perceived their solution to be "fairly effective." Overall, the findings on the personal problem solving task are consistent with Davey (1994) and Ladouceur and colleagues' (1998) conclusion that individuals with GAD do not necessarily have poor problem solving skills, rather they have a negative belief about the problem solving process. However, the interpretation of these findings should be made with caution as it is unknown whether "effective" solutions as rated by participants would be regarded as such by an independent judge.

Influence of processing style on worry. The fifth hypothesis was not supported. Processing style training did not influence participants' reported tendency to worry. Moreover processing style training did not appear to influence participants' reported frequency and duration of worry episodes or the intensity of anxiety symptoms during the week following training. This finding is consistent with the preliminary analyses that indicated there was no existing relationship between processing style and *trait-lik*e pathological worry. However, there was a significant association at pretraining between an abstract processing style and participants' reported tendency to worry *over the past week*. Therefore, the lack of training effects at follow-up, could account for null finding between processing style training and worry. Again, this

highlights the limitation of not examining the training effects immediately following training. Future studies could use a behavioural measure of worry to examine the immediate influence of processing style on worry. For example, the use of a catastrophizing interview may be beneficial as it could be a measure of worry and processing style. That is, the number of catastrophizing steps generated could be reflective of worry (Vasey & Borkovec, 1992), and the level of concreteness of each step could be a measure of processing style (Stöber et al., 2000). Stöber and colleagues used participants' responses on a catastrophizing interview as a measure of concreteness and reported that catastrophizing steps for topics that people worried about were rated as more abstract compared to the catastrophizing steps of topics that people did not worry about. Therefore, future studies may benefit from the use of a catastrophizing interview as a measure of worry and as a measure of the effectiveness of processing style training.

Alternatively, the training task used in the present study may not have influenced worry, even if the training had been durable. Based on theories of state-dependent learning, training an individual to adopt an abstract or concrete processing style during a 'neutral mood,' as was done in the present study, may not generalize to a worry episode. Therefore, it is hypothesized that the negative affect that is often present during a worry episode (Borkovec et al., 1983) could potentially interfere with the adoption of a concrete processing style during worry. As a result, participants trained to adopt a concrete processing style may revert to an abstract processing style during worry. Hence, there may be more robust findings of cognitive processing style training on worry (i.e., reductions in frequency, duration and reported tendency to worry) if a negative mood is induced during the training task. It would be beneficial for future studies to examine the effects of processing style training during an induced 'negative mood,' as well as following a worry induction task, to determine if the training effects would persist after a worry episode.

Furthermore, the manipulation check used to determine level of concreteness of processing style in the present study might have potentially influenced study findings. The lack of association between pretraining concreteness and trait worry was unexpected based on the reduced concreteness theory of worry (Stöber, 1998) and Stöber and Borkovec's (2002) finding that concrete problem descriptions were associated with a reduced tendency to worry. Differences between the manipulation checks used by Stöber and colleagues compared to the present study may be an explanatory factor. Stöber and Borkovec rated the concreteness of participants' *problem descriptions* (i.e., the risks and consequences), whereas participants in the present study developed *problem solutions*, which were then measured on level of concreteness. In addition, the problems participants described in Stöber and Borkovec's study were personally relevant, whereas the present study used standardized problems. Therefore, the design of the manipulation check itself may have influenced level of concreteness ratings.

Finally, as previously mentioned, the study findings were inconsistent with Stöber and Borkovec (2002)'s finding that following CBT, greater concreteness of problem elaborations was associated with greater reductions in worry. Because the CBT protocol did not directly target concreteness of thought, whether level of concreteness of problem descriptions had a causal role in influencing worry is unknown. Additional factors, such as increases in positive affect or modified cognitive distortions resulting from cognitive restructuring techniques, may have led to the reduction of worry independent of the associated increase in level of concreteness following CBT. Therefore, the role of concreteness in the reduction of worry is not clear. Taken together, it appears that the relationship between processing style and worry may be more complex than initially conceptualized. Future studies would benefit from a direct manipulation of processing style during a worry episode to determine whether a causal relationship exists between

processing style and worry.

Influence of cognitive processing style in GAD

The present study examined the influence of modifying processing style, on GAD symptoms and related cognitive processes, including interpretation bias towards threat, negative problem orientation, and worry. Although there appeared to be a small influence of processing style, the change does not appear to be specific to GAD. Multiple explanations may account for the small and null findings.

First, although there appears to be a *relationship* between processing style and GAD-related symptoms and cognitive processes, modifying cognitive processing style may not result in symptom reduction or changes in cognitive processes (MacLeod, Koster, & Fox, 2009). MacLeod and colleagues (2009) suggest that although some cognitive biases correlate with symptoms of a disorder, they may not have a causal role in the development or maintenance of the disorder. As a result, modifying the cognitive bias will have no effect on associated symptoms. Given this, although there were significant correlations between initial processing style and cognitive processes associated with GAD (e.g., negative appraisals of ambiguous scenarios and negative problem orientation) in the present study, the non-significant relationship between processing style and severity of GAD symptoms or trait worry may account for why a successful manipulation of concreteness did not appear to influence worry. This would also suggest that even with a more robust modification of cognitive processing style, there would be no direct impact on GAD symptoms.

Another possible explanation for the lack of findings is that because there are multiple cognitive biases associated with anxiety and GAD, change in one cognitive bias may only have a small effect on symptoms (Hallion & Ruscio, 2011). Therefore, the modification of only

cognitive processing style, as was done in the present study, may not influence GAD symptoms. Therefore, it is possible that targeting multiple cognitive biases at once would result in a larger effect (Hallion & Ruscio, 2011). Moreover, it is possible that training one cognitive bias, would not influence other cognitive biases, and could account for why processing style training had null effects or only minimal influence on interpretation bias, negative problem orientation, and worry in people with GAD.

A third explanation is that processing style training may have influenced GAD-related cognitive processes, but the delay in measurement until the one-week follow-up may have resulted in immediate effects not being detected. As a result, perhaps the lack of durability of the training resulted in the null findings. Hallion and Ruscio (2011) reported that the degree of change in cognitive biases might moderate the effect of CBM on symptoms. In addition, the authors suggest that modifying cognitive biases may not have an immediate effect on symptoms, but may result in a gradual change over time. Therefore, repeated processing style training may have a cumulative effect on the underlying cognitive processes of GAD and result in greater symptom reduction. For example, Mathews, Ridgeway, Cook, and Yiend (2007) reported that participants who received repeated sessions of interpretation modification training reported lower trait anxiety scores compared to individuals who only received one CBM training session. Therefore, repeated CBM training might result in training effects that are more durable and robust, and result in greater reductions in associated anxiety symptoms.

Limitations and Future Directions

As discussed in the previous sections, the current study had several limitations. First, due to the lack of durable training effects at follow-up, it was difficult to determine whether training did not have an impact on negative problem orientation, problem solving style or worry, or if the

immediate training effects were short-lived and as a result were undetected. Future studies may benefit from the assessment of the cognitive processes immediately following training to clarify the relationship between processing style and cognitive processes in GAD. Furthermore, the use of behavioural or momentary measures in future studies would allow for the assessment of immediate changes in symptoms and cognitive processes that dispositional or trait-like measures might not detect.

In addition, future studies may benefit from examining the effects of repeated cognitive processing style training, as it can take multiple training sessions before reductions in anxiety symptoms are be detected (e.g., Forde et al., 2005). Watkins, Baeyens, and Read (2009) examined the influence of repeated processing style training in depression. The authors reported that repeated processing style training had a strong influence on rumination and depression symptoms. In their study, participants engaged in daily processing style training for one week. Following repeated processing style training, participants displayed greater concreteness of problem descriptions, as well as a reduction in rumination and depression symptoms. The findings highlight the robustness of repeated cognitive processing style training on depression symptoms and related cognitive processes, which had not been examined previously in the literature. Therefore, it may be beneficial for future studies to examine the use of repeated cognitive processing style to determine whether there is a relationship between cognitive processing style and GAD symptoms and related cognitive processes.

Future studies may also benefit from examining a different method of training processing style. There are various types of cognitive training tasks (e.g., implicit, explicit, and computer-based, for review see MacLeod et al., 2009); perhaps an alternative method of training cognitive processing style may have a stronger influence on cognitive processes in GAD. Watkins and

colleagues (2008; experiment 3) examined the influence of an implicit processing style training task on emotional reactivity, a risk factor for developing depression. Participants were required to read scenario descriptions that remained ambiguous until the final word was presented as a fragment. Completing the fragment led the participants to make the appropriate interpretation of the scenario for the intended training effect (abstract or concrete). The authors reported that individuals trained to adopt a concrete processing style endorsed more concrete descriptions of the scenario than did individuals trained to adopt an abstract processing style. Therefore, future studies examining the role of the level of concreteness of processing style in GAD, may benefit from the use of alternative processing style training tasks.

Conclusion

Findings from the present study provide empirical support that processing style training can influence the level of concreteness of processing style in individuals with GAD. Moreover, these findings suggest that manipulating processing style may have subsequent effects on the interpretation of ambiguous scenarios and the effectiveness of problem solutions. However, depression symptoms appeared to have a significant influence on the influence of processing style training on appraisals of ambiguous scenarios. Furthermore, the processing style training did not lead to changes in negative problem orientation or self-reported problem solving style and did not have an impact on worry or anxiety. One possible explanation for these findings is that concreteness of thought is not associated with GAD symptoms and processes, as assessed via dispositional or trait-like measures. A second possible explanation may be that the manipulation check had a direct influence on concreteness ratings and as a result may have influenced the findings. A third possible explanation is that the delay between training and the reassessment of GAD symptoms and cognitive processes may have been too long and as a result,

possible immediate effects of training may have gone undetected. Finally, multiple sessions of cognitive training may be required to produce changes in trait-like psychological characteristics such as negative problem orientation, problem solving style and worry.

Future studies should (1) examine the effectiveness and durability of alternative methods of cognitive processing style training; (2) determine the most reliable and accurate way to measure concreteness; and (3) incorporate various outcome measures, including behavioural and momentary measures of worry and cognitive processes related to GAD. Overall, processing style training was effective in inducing a concrete or abstract processing style in individuals with GAD; therefore, by accounting for the study limitations, future studies might help to clarify the influence of processing style on GAD symptoms and related cognitive processes.

Appendix

Informed Consent Form

Title of Study: The Problem-Solving Study

You are being asked to participate in a research study. Before you give your consent to be a volunteer, it is important that you read the following information and ask as many questions as necessary to be sure you understand what you will be asked to do.

Investigators:
Elizabeth Pawluk, B.A., Graduate Student, Department of Psychology, Ryerson University
Naomi Koerner, Ph.D., Assistant Professor, Department of Psychology, Ryerson University
Martin M. Antony, Ph.D., Professor, Department of Psychology, Ryerson University

Purpose of the Study

The purpose of this study is to examine psychological factors involved in problem-solving.

Description of the Study

The experiment will involve two visits to the Psychology Research and Training Centre at Ryerson University, located at 105 Bond Street (2nd floor). The total time commitment will be approximately 4 hours.

Session 1: You will complete a package of questionnaires about your thoughts, emotions, and behaviour, a task in which you will be presented with a series of situations that you will be instructed to think about in a certain way, and a problem-solving exercise. Session 1 will take approximately 2 hours. At the end of Session 1, you will be given a problem solving task and a daily mood and worry record to complete between Session 1 and 2, which will take a maximum time commitment of 1 hour over the course of the week.

Session 2: This visit will be scheduled for approximately 7 days after Session 1. In Session 2, you will return to the Psychology Research and Training Centre and will submit your problem solving task and daily mood and worry record. In addition, you will be asked to complete a package of questionnaires about your thoughts, emotions, and behaviour and a problem solving exercise. Session 2 will take approximately 1 hour.

Potential Risks or Discomforts

There is minimal risk involved if you agree to take part in this study. You understand that you may experience some negative emotions when completing the questionnaires. You have the right to refuse or discontinue participation at any time. If you decided to stop participating, you will still be entitled to compensation for any tasks that you have begun to complete during a visit.

Potential Benefits of the Study to You or Others

It is possible that you will not receive any benefits from participating in this study, other than the compensation mentioned below. However, you may derive benefit from the self-assessment as it may increase your awareness of your thoughts, emotions and behaviours. You may also develop a better understanding of research methodology, and your participation will provide researchers with valuable insight.

Confidentiality

Information disclosed in this study will remain completely confidential; however, there are five cases in which the experimenters might need to break confidentiality:

(1) if you intend to harm yourself;

(2) if you intend to harm someone else;

(3) if there is reasonable suspicion that a child up to the age of 16 years has been abused or neglected, or is at risk of neglect or abuse, we are required by law to report this to the Children's Aid Society right away;

(4) if our files are subpoenaed by the courts (records can be opened by a specific court order);

(5) if a regulated health professional has engaged in inappropriate sexual behaviour toward a patient and you provide us with the name of this individual, we are obligated to report them to their regulatory body.

This informed consent agreement and all data that identifies you will be stored in a locked storage space in the Psychology Research and Training Centre. An ID number as opposed to your name will be used on the phone interview you took part in prior to coming to the Psychology Research and Training Centre, on all questionnaires you complete, and in all computer files that contain the data you generate during the study. Your phone interview and questionnaires will be kept in a locked file cabinet, separate from this consent agreement and any identifying information. This consent form, the notes from your telephone interview and the questionnaires will be kept for 7 years after the publication of this research, after which they will be shredded. Your confidentiality will be protected to the full extent allowed by law. Only group findings will be reported in publications and presentations arising from this research.

Compensation for Participation

You will earn up to $30 depending upon how many sessions you complete. You will earn $15 for activities you complete in today's session and another $15 for completing the problem-solving task, daily mood and worry record, and activities in Session 2, to be scheduled approximately 7 days from today. You are asked to arrange to transport yourself to the Psychology Research and Training Centre at Ryerson University. You will not be paid for the telephone interview that you completed to determine eligibility.

Voluntary Nature of Participation

Participation in this study is voluntary. Your choice of whether to participate will not influence your future relations with Ryerson University. If you decide to participate, you are free to withdraw your consent and to stop your participation at any time without penalty or loss of benefits to which you are allowed. Your right to withdraw your consent also applies to our use of your data. If you decide that you do not want us to keep or analyze data that you have provided during the course of your participation in this study, please feel free to notify us.

At any point in the study, you may refuse to answer any question or stop participation altogether.

Questions about the Study: If you have any questions about the research now, please ask. If you have questions later about the research, you may contact Elizabeth Pawluk B.A., Graduate Student, Department of Psychology, Ryerson University, 416-979-5000 extension 2182. You may also contact Dr. Naomi Koerner, Ph.D., Department of Psychology, Ryerson University, 416-979-5000 extension 2151.

If you have questions regarding your rights as a participant in this study, you may contact Dr. Nancy Walton at the Ryerson University Research Ethics Board for information.

Nancy Walton, PhD

Chair, Research Ethics Board

Office of the Vice President, Research and Innovation

Ryerson University, 350 Victoria Street, Room YDI 1154

Toronto, Ontario, Canada M5B 2K3

Phone: (416) 979-5000 Ext. 6300, Fax: (416) 979-5336

Email: rebchair@ryerson.ca Web: http://www.ryerson.ca/research

Agreement

Your signature below indicates: (1) that you have read the information in this agreement and have had a chance to ask any questions you have about the Problem Solving study ; (2) that you agree that information collected from you during the telephone interview for the Problem Solving study can be retained and analyzed and (3) that you agree to be in Problem Solving study (as described in this consent form) and (4) that you have been told that you can change your mind and withdraw your consent to participate at any time. You have been given a copy of this agreement. You have been told that by signing this consent agreement you are not giving up any of your legal rights.

_____

Name of Participant (please print)

_____ _____

Signature of Participant Date

_____ _____

Signature of Experimenter Who Obtained Informed Consent Date

Debriefing Form

Purpose of the Study: Research as shown that people who worry excessively have a difficult time solving problems, doubt their problem-solving abilities, and become very anxious when they are confronted with uncertain situations. The goal of this study is to try to understand why people who worry excessively have a difficult time with problem-solving. One possibility is that thinking about a problem in a particular way may cause anxiety to increase in uncertain situations. Specifically, when people think about their problems in vague terms (for example, "if I lose my job, I don't know what I'm going to do…it will be really bad"), this may prevent a person from focusing on the relevant facts related to their situation and on potential solutions to the problem (for example, "there is no evidence that I am going to be laid off anytime soon, so for the time being there is no problem to tackle OR "there is no evidence that I am going to be laid off anytime soon, but perhaps I can schedule a meeting with my boss to discuss the status of my job position).

This study will help us to get a better understanding of the factors that lead some people to experience chronic worry and anxiety. Knowing about such factors can lead to improvements in psychological treatments for excessive worry. Your willingness to participate in this study is greatly appreciated. Your input will help advance our understanding of ways that chronic worry can be alleviated. Our list of resources has titles of books on worry management, as well as referral sources (please turn over this page for the list).

Resources: We provide everyone who completes this study with the same list of resources, in case they are interested in learning more about worry or anxiety. Our list of resources has titles of books on worry management, as well as referral sources (please turn over this page for the list).

Contact Information: If you have any questions or concerns about this experiment or your participation in this study you may contact:

Elizabeth Pawluk, BA	Naomi Koerner, PhD	Nancy Walton, PhD
Main Study Investigator	MA Study Supervisor	Chair, Research Ethics Board
Department of Psychology	Department of Psychology	Ryerson University,
Ryerson University	Ryerson University	350 Victoria Street
105 Bond Street	350 Victoria Street	Room YDI 1154
Toronto, ON M5B 2K3	Toronto, ON M5B 2K3	Toronto, ON M5B 2K3
(416) 979-5000 x2182	(416) 979-5000 x2151	(416) 979-5000 x 6300
caplab@psych.ryerson.ca	naomi.koerner@psych.ryerson.ca	rebchair@ryerson.ca

If you would like any information about the results of the study once it is completed, please contact Elizabeth Pawluk.

A note about disclosure: In order to maintain the integrity of this research, we ask that you not disclose the purpose of this experiment to others who may be interested in taking part in this study. When participants have too much prior knowledge about the purpose of an experiment, this can affect how they behave in the experiment and the data for that person may not be usable.

Thank you very much for participating in this study!

Self-Help Books for Worry

Gyoerkoe, K.L., & Wiegartz, P.S. (2006). 10 simple solutions to worry: How to calm your mind, relax your body, & reclaim your life. Oakland, CA: New Harbinger.

Hazlett-Stevens, H. (2005). Women who worry too much: How to stop worry and anxiety from ruining relationships, work, & fun. Oakland, CA: New Harbinger.

Greenberger, D., & Padesky, C. A. (1995). Mind Over Mood. New York, NY: Guilford Press.

Meares, K., & Freeston, M. (2008). Overcoming worry: A self-help guide using cognitive behavioral techniques. New York: Basic Books.

Other anxiety resources are available at:
http://www.martinantony.com/links-RecReadingsandVideos.html

Referrals in Toronto Area

OHIP-Covered and Sliding Scale Referrals

Adult Mental Health Program
Humber River Regional Hospital, Toronto
Contact: Heather Wheeler, Ph.D.
Tel: 416-658-2003

Anxiety Disorders Clinic
Centre for Addiction and Mental Health
250 College St., Toronto
Tel: 416-979-6819

Ryerson University Centre for Student Development and Counselling
(Available to Ryerson Students Only)
350 Victoria St., Room JOR-07C, Lower Ground Floor, Jorgenson Hall, Toronto
Tel: 416-979-5195

Private Psychology Referrals

CBT Associates of Toronto
100 Adelaide St. West, Suite 805, Toronto
Tel: 416-363-4228
Web: http://www.cbtassociates.net/
E-Mail: eilenna.denisoff@cbtassociates.net
or peter.farvolden@cbtassociates.net

Hank Frazer, Ph.D., C.Psych.
3852 Finch Ave., Unit 309, Scarborough
Tel: 416-298-9143 or 416-298-1102

Tae Hart, Ph.D., C.Psych.
Tel: 416-473-7132
Email: stacey.hart@psych.ryerson.ca

Trevor Hart, Ph.D., C.Psych
114 Maitland St., Toronto
Tel: 416-979-5000, ext. 1-6192
E-Mail: therapy@drhart.ca

Brian Ridgley, Ph.D.
Ridgley, Thomas, and Associates
60 St. Clair Avenue East, Suite 900, Toronto
Tel: 416-944-3747
E-Mail: brianridgley@rogers.com

Heather Wheeler, Ph.D., C.Psych.
1333 Sheppard Ave. East, Suite 225,
Toronto Tel: 416-788-3038
E-Mail: hwheeler@rogers.com

References

Alexander, M. J., Haugland, G., Lin, S. P., Bertollo, D. N., & McCorry, F. A. (2008). Mental health screening in addiction, corrections and social service settings: Validating the MMS. *International Journal of Mental Health and Addiction, 6*, 105-119. doi:10.1007/s11469-007-9100-x

Anderson, R. J., Goddard, L., & Powell, J. H. (2009). Social problem-solving processes and mood in college students: An examination of self-report and performance-based approaches. *Cognitive Research and Therapy, 33*, 175-186. doi:10.1007/s10608-007-9169-3

American Psychiatric Association. (2000). *Diagnostic and statistical manual for mental disorders* (4th ed., text rev.). Washington, DC: Author.

Armor, D. A., & Sackett, A. M. (2006). Accuracy, error and bias in predictions for real versus hypothetical events. *Journal of Personality and Social Psychology, 91*, 583-600. doi:10.1037/0022-3514.91.4.583

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

Behar, E., Alcaine, O., Zuellig, A. R., & Borkovec, T. D. (2003). Screening for generalized anxiety disorder using the Penn State Worry Questionnaire: A receiver operating characteristic analysis. *Journal of Behavior Therapy, 34*, 25-43. doi:10.1016/S0005-7916(03)00004-1

Borkovec, T. D., Alcaine, O. M., & 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, NY: 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,* 153-158. doi:10.1016/0005-7967(90)90027-G

Borkovec, T. D., Ray, W. J., & Stöber, J. (1998). Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research, 22,* 561-576. doi:10.1023/A:1018790003416

Borkovec, T. D., Robinson, E., Pruzinsky, T. & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy, 21,* 9-16. doi:10.1016/0005-7967(83)90121-3

Borkovec, T. D., & Roemer, L. (1995). Perceived functions of worry among generalized anxiety disorder subjects: Distraction from more emotionally distressing topics? *Journal of Behavior Therapy and Experimental Psychiatry, 26,* 25-30. doi:10.1016/0005-7916(94)00064-S

Brosschot, J. F., & Van Der Doef, M. (2006). Daily worrying and somatic health complaints: Testing the effectiveness of a simple worry reduction intervention. *Psychology and Health, 21,* 19-31. doi:10.1080/14768320500105346

Cohen, J. (1977). *Statistical power analysis for the behavioural sciences* (2nd ed.). New York, NY: Academic Press.

Craske, M. G., & Barlow, D. H. (2006). *Mastery of your anxiety and worry* (2nd ed.). New York, NY: Oxford University Press.

Davey, G. C. L. (1994). Worry, social problem-solving abilities and social problem-solving confidence. *Behaviour Research and Therapy, 32,* 327-330. doi:10.1016/0005-7967(94)90130-9

Davey, G. C. L., Hampton, J., Farrell, J., & Davidson, S. (1992). Some characteristics of

worrying: Evidence for worrying and anxiety states as separate constructs. *Personality and Individual Differences, 13,* 133–147. doi:10.1016/0191-8869(92)90036-O

Dugas, M. J., Letarte, H., Rhéaume, J., Freeston, M. H., & Ladouceur, R. (1995). Worry and problem solving: Evidence of a specific relationship. *Cognitive Therapy and Research, 19,* 109-120. doi:10.1007/BF02229679

D'Zurilla, T. J., & Goldfried, M. R. (1971). Problem solving and behavior modification. *Journal of Abnormal Psychology, 78,* 107-126. doi:10.1037/h0031360

D'Zurilla, T. J., Nezu, A. M., & Maydeu-Olivares, A. (2001). *Manual for the Social Problem Solving Inventory-Revised.* North Tonawanda, NY: Multi-Health Systems.

Eysenck, M. W. (1997). *Anxiety and cognition: A unified theory.* Hove, UK: Psychology Press.

Forde, F., Frame, M., Hanlon, P., MacLean, G., Nolan, D., Shajahan, P., & Troy, E. (2005). Optimum number of sessions for depression and anxiety. *Nursing Times, 101,* 36-40.

Förster, J., Friedman, R. S., & Liberman, N. (2004). Temporal construal effects on abstract and concrete thinking: Consequences for insight and creative cognition. *Journal of Personality and Social Psychology, 87,* 177-189. doi: 10.1037/0022-3514.87.2.177

Fresco, D. M., Mennin, D. S., Heimberg, R. G., & Turk, C. L. (2003). Using the Penn State Worry Questionnaire to identify individuals with generalized anxiety disorder: A receiver operating characteristic analysis. *Journal of Behavior Therapy and Experimental Psychiatry, 34,* 283-291. doi:10.1016/j.jbtep.2003.09.001

Hallion, L. S., & Ruscio, A. M. (2011). A meta-analysis of the effect of cognitive bias modification on anxiety and depression. *Psychological Bulletin*. Advance online publication. doi: 10.1037/a0024355

Heller, D., Stephan, E., Kifer, Y., & Sedikides, C. (2011). What will I be? The role of temporal perspective in predictions of affect, traits, and self-narratives. *Journal of Experimental*

Social Psychology, 47, 610-615. doi:10.1016/j.jesp.2011.01.010

Hoppitt, L., Mathews, A., Yiend, J., & Mackintosh, B. (2010). Cognitive bias modification: The critical role of active training in modifying emotional responses. *Behavior Therapy, 14*, 73-81. doi:10.1016/j.beth.2009.01.002

Kessler, R. C., Andrade, L. H., Bijl, R. V., Offord, D. R., Demler, O. V., & Stein, D. J. (2002). The effects of co-morbidity on the onset and persistence of generalized anxiety disorder in the ICPE surveys. *Psychological Medicine, 32*, 1213-1225. doi:10.1017/S0033291702006104

Koerner, N., & Dugas, M. (2008). An investigation of appraisals in individuals vulnerable to excessive worry: The role of intolerance of uncertainty. *Cognitive Therapy and Research, 32*, 619-638. doi:10.1007/s10608-007-9125-2

Ladouceur, R., Blais, R., Freestone, M. H., & Dugas, M. J. (1998). Problem solving and problem orientation in generalized anxiety disorder. *Journal of Anxiety Disorders, 12*, 139-152. doi:10.1016/S0887-6185(98)00002-4

Leech, N. C., Barrett, K. C., & Morgan, G. A. (2008). *SPSS for intermediate statistics: Use and interpretation.* New York, NY: Taylor and Francis.

Mackintosh, B., Mathews, A., Yiend, J., Ridgeway, V., & Cook, E. (2006). Induced biases in emotional interpretation influences stress vulnerability and endure despite changes in context. *Behavior Therapy, 37*, 209-222. doi:10.1016/j.beth.2006.03.001

MacLeod, C., Koster, E. H. W., & Fox, E. (2009). Whither cognitive bias modification research? Commentary on the special section articles. *Journal of Abnormal Psychology, 118*, 89-99. doi: 10.1037/a0014878

MacLeod, C., & Rutherford, E. (2004). Information-processing approaches: Assessing the selective functioning of attention, interpretation and retrieval. In R.G. Heimberg, C.L.

Turk & D.S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice* (pp. 109-142). New York, NY: Guilford Press.

Mathews, A., Ridgeway, V., Cook, E., and Yiend, J. (2007). Inducing a benign interpretational bias reduces trait anxiety. *Journal of Behavior Therapy and Experimental Psychiatry, 38,* 225-236. doi:10.1016/j.jbtep.2006.10.011

McGraw, K. O., & Wong, S. P. (1996). Forming inferences about some intraclass correlation coefficients. *Psychological Methods, 1,* 30-46. doi: 10.1037/1082-989X.1.1.30

Meng, X-L., Rosenthal, R., & Rubin, D. B. (1992). Comparing correlated correlation coefficients. *Psychological Bulletin, 28,* 201-209. doi: 10.1037/0033-2909.111.1.172

Meyer, T. J., Miller, M. L., Metzger, R. K., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28,* 486-495. doi:10.1016/0005-7967(90)90135-6

Miller, G. M., & Chapman, J. P. (2001). Misunderstanding analysis of covariance. *Journal of Abnormal Psychology, 110,* 40-48. doi: 10.1037/0021-843X.110.1.40

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). Oxford, UK: John Wiley and Sons.

Newman, M. G., Zuellig, A. R., Kachin, K. E., Constantino, M. J., Prezeworski, A., Erickson T., & Cashman-McGrath, L. (2002). Preliminary reliability and validity of the Generalized Anxiety Disorder Questionnaire–IV: A revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy, 33,* 215-233. doi:10.1016/S0005-7894(02)80026-0

Paivio, A. (1971). *Imagery and verbal processes.* New York, NY: Holt, Rinehart and Winston.

Paivio, A. (1986). *Mental representations: A dual coding approach.* New York, NY: Oxford University Press.

Paivio, A., & Marschark, M. (1991). Integrative processing of concrete and abstract sentences. In A. Paivio (Ed.), *Images in the mind: The evolution of a theory* (pp. 134-154). New York, NY: Harvester Wheatsheaf.

Platt, J. J., & Spivack, G. (1975). *Manual for the Means-Ends Problem-Solving test (MEPS): A measure of interpersonal problem solving skills.* Philadelphia, PA: Hahnemann Medical College and Hospital.

Provencher, M. D., Dugas, M. J., & Ladouceur, R. (2004). Efficacy of problem-solving training and cognitive exposure in the treatment of generalized anxiety disorder: A case replication series. *Cognitive and Behavioral Practice, 11*, 404-414. doi:10.1016/S1077-7229(04)80057-9

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychology Measurement, 1*, 385-401. doi:10.1177/014662167700100306

Robichaud, M., & Dugas, M. J. (2005a). Negative problem orientation (Part I): Psychometric properties of a new measure. *Behaviour Research and Therapy, 43*, 391-401. doi:10.1016/j.brat.2004.02.007

Robichaud, M., & Dugas, M. J. (2005b). Negative problem orientation (Part II): Construct validity and specificity to worry. *Behaviour Research and Therapy*, *43*, 403-412. doi:10.1016/j.brat.2004.02.008

Robinson, C. M., Klenck, S. C., & Norton, P. J. (2011). Psychometric properties of the Generalized Anxiety Disorder Questionnaire for DSM-IV among four racial groups. *Cognitive Behaviour Therapy, 39*, 251-261. doi:10.1080/16506073.2010.486841

Schönpflug, W. (1989). Anxiety, worry, prospective orientation, and prevention. In C.D. Spielberger and I.G. Sarason (Eds.), *Stress and anxiety* (Vol. 12, pp. 245-258). Washington, DC: Hemisphere.

Sheehan, D. V., Lecrubier, Y., Harnett Sheehan, K., Janavs, J., Weiller, E., Keskiner, A., … Dunbar, G. C. (1997). The validity of the Mini International Neuropsychiatric Inventory (MINI) according to the SCID-P and its reliability. *European Psychiatry, 12,* 232-241. doi:10.1016/S0924-9338(97)83296-8

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., … Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59,* 22-33.

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86,* 420-428. doi: 10.1037/0033-2909.86.2.420

Stöber, J. (1998). Worry, problem elaboration and suppression of imagery: The role of concreteness. *Behaviour Research and Therapy, 36,* 751-756. doi:10.1016/S0005-7967(98)00027-8

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. doi:10.1016/S0005-7967(98)00031-X

Stöber, J., & Borkovec, T. D. (2002). Reduced concreteness of worry in generalized anxiety disorder: Findings from a therapy study. *Cognitive Theory and Research, 26,* 89-96. doi:10.1023/A:1013845821848

Stöber, J., Tepperwien, S., & Staak, M. (2000). Worrying leads to reduced concreteness of problem elaborations: Evidence for the avoidance theory of worry. *Anxiety, Stress and*

Coping, 13, 217-227. doi:10.1080/10615800008549263

Szabó, M., & Lovibond, P.F. (2002). The cognitive content of naturally occurring worry episodes. *Cognitive Therapy and Research, 26*, 167-177. doi:10.1023/A:1014565602111

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn and Bacon.

Tallis, F., Davey, G. C. L., & Capuzzo, N. (1994). The phenomenology of nonpathological worry: A preliminary investigation. In G.C.L. Davey & F. Tallis (Eds.), *Worrying: Perspectives on theory assessment and treatment* (pp. 61-89). Chichester, UK: John Wiley and Sons.

Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review, 110*, 403-421. doi:10.1037/0033-295X.110.3.403

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Bulletin, 117*, 440-463. doi:10.1037/a0018963

Tucker, D. M., & Newman, J.P. (1981). Verbal versus imaginal cognitive strategies in the inhibition of emotional arousal. *Cognitive Therapy and Research, 5*, 197-202. doi:10.1007/BF01172527

Vasey, M. W., & Borkovec, T. D. (1992). A catastrophizing assessment of worrisome thought. *Cognitive Therapy and Research, 16*, 505-520. doi:10.1007/BF01175138

Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological Bulletin, 134*, 163-206. doi:10.1037/0033-2909.134.2.163

Watkins, E. R., Baeyens, C.B., & Read, R. (2009). Concreteness training reduces dysphoria: Proof-of-principle for repeated cognitive bias modification in depression. *Journal of Abnormal Psychology, 118*, 55-64. doi:10.1037/a0013642

Watkins, E., Moberly, N. J., & Moulds, M. L. (2008). Processing mode causally influences

emotional reactivity: Distinct effects of abstract versus concrete construal on emotional response. *Emotion, 8,* 364-378. doi:10.1037/1528-3542.8.3.364

Watkins, E., & Moulds, M. (2005). Distinct modes of ruminative self-focus: Impact of abstract versus concrete rumination on problem solving in depression. *Emotion, 5,* 319-328. doi:10.1037/1528-3542.5.3.319

Watkins, E., & Moulds, M. (2007). Reduced concreteness of rumination in depression: A pilot study. *Personality and Individual Differences, 43,* 1386-1395. doi:10.1016/j.paid.2007.04.007

Watkins, E., & Moulds, M., & Mackintosh, B. (2005). Comparisons between rumination and worry in a non-clinical population. *Behaviour Research and Therapy, 43,* 1577-1585. doi:10.1016/j.brat.2004.11.008

Yiend, J., Mackintosh, B., & Mathews, A. (2005). Enduring consequences of experimentally induced biases in interpretation. *Behaviour Research and Therapy, 43,* 779-797. doi:10.1016/j.brat.2004.06.00