MINDFULNESS AND EXPRESSIVE WRITING IN COLLEGE STUDENTS
WITH PATHOLOGICAL WORRY

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ABSTRACT

Title: Mindfulness and Expressive Writing in College Students with Pathological Worry

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A growing body of literature supports the relationship between pathological worry and deleterious health consequences, including having a diagnosis of generalized anxiety disorder (GAD; Waters & Craske, 2005). Individuals who suffer from pathological worry tend to live life in the future rather than in the present moment. Mindfulness, a practice grounded in the acceptance of present-moment experience, can therefore be conceptualized as the antithesis of worry. Thus, the current study aimed to better understand the interplay between mindfulness and pathological worry and the potential role of mindfulness practice in reducing pathological worry. This study examined the effect of a brief mindful breathing practice and an expressive writing exercise on psychological health outcomes in a sample of college students with pathological worry. The study aimed to replicate findings that expressive writing is helpful for individuals with pathological worry, and it aimed to test the hypothesis (Brody & Park, 2004) that expressive writing itself is a process conceptually similar to mindfulness. Participants practiced either a mindful breathing exercise or a relaxation exercise prior to engaging in three consecutive sessions of either expressive writing or a control writing exercise. It was expected that individuals who practiced mindfulness and engaged in expressive writing would have lower levels of depression, worry, and GAD symptoms as well as increased levels of self-reported mindfulness when assessed one month after completing the study, but these hypotheses were not supported. It was found, however, that individuals who engaged in expressive writing demonstrated a decrease in negative affect over time compared to those who engaged in control
writing. Furthermore, those who engaged in mindfulness practice compared to those who
engaged in relaxation practice reported higher levels of mindful awareness directly following the
writing sessions. The study has the practical implication of understanding the utility of brief
mindfulness practice to alleviate symptoms of worry and GAD in a sample of non-treatment-
seeking high worriers.
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CHAPTER 1
INRODUCTION

Worry as a Pathological Process

Worry is a normal part of human functioning. Studies comparing high-worriers or individuals with generalized anxiety disorder (GAD) to normal worriers indicate that both groups tend to worry about the same range of topics, such as family, relationships, health, work, and school (Craske, Rapee, Jackel, & Barlow, 1989; Roemer, Molina, & Borkovec, 1997). However, pathological worry—or worry that is excessive and uncontrollable and therefore interferes with daily functioning—can be indicative of clinically significant distress (N.B. for the purpose of this paper, “pathological” and “high” worry will be used interchangeably, as they appear that way in the extant literature). The revised third edition of the Diagnostic and Statistical Manual for Mental Disorders (American Psychiatric Association [APA], 1987) labeled excessive and uncontrollable worry as the cardinal feature of GAD, thus highlighting the importance of this psychological process to clinically significant anxiety. Since the 1980s, a substantial body of literature has attempted to elucidate the characteristics and consequences of worry and delineate the boundaries of normal and pathological worry. Borkovec, Robinson, Pruzinsky, and DePree (1983) provided an early, working definition of worry that has been modified and extended over the years:

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)

Early work in the study of high-worrying individuals suggested that they were more likely than non-worriers to report negative and ambivalent cognitions in response to a period of relaxed wakefulness (Pruzinsky & Borkovec, 1990). Borkovec and Inz (1990) also investigated the content of worry in treatment-seeking adults with GAD. Compared to non-anxious control participants, the GAD sample reported a predominance of negatively valenced thought content during a relaxation exercise. Following a course of psychotherapy for GAD, anxious individuals demonstrated a predominance of positively-valenced images more closely resembling those of non-anxious control participants, suggesting that psychotherapy was able to compensate for an initial deficit of positively-valenced images typically found in individuals with GAD. In addition, an investigation of high-worrying undergraduates suggests that worry is more dominated by thoughts than images and that the experience of worry in high-worrying individuals tends to have significantly greater thought content compared to that of normal controls (Freeston, Dugas, & Ladouceur, 1996).

_Epidemiology of non-pathological worry_

Although worry is a component of several anxiety and mood disorders, its prevalence has been examined most directly in the context of GAD. Tallis, Davey, and Capuzzo (1994) conducted one study that helps describe the experience of non-pathological worry. They examined a sample of undergraduates and normal adults and found that the majority (58.4%) worried at least once every 2 to 3 days. The duration of their worry was reported to be relatively normally distributed, ranging from fleeting to 2 hours or more. Most participants reported worrying in the late evening or early morning, and their worry covered a variety of topics
including work (17%), school performance (11%), health (10%), finances (10%), and intimate relationships (9%). The most frequently-reported worry topic in persons with GAD and non-anxious controls has tended to be interpersonal relationships (Roemer et al., 1997). The most pronounced differences across several studies that measured differences in normal worry and worry associated with GAD tend to be a higher frequency and duration of worry (e.g., Hoyer, Becker, & Roth, 2001) and a higher percentage of worries relating to minor matters (Roemer et al., 1997).

**Epidemiology of GAD**

GAD has a lifetime prevalence of 5.7% in the general population of the United States (Kessler et al., 2005). It is associated with long-term impairment, interpersonal difficulties, and health concerns, such as cardiovascular problems (Waters & Craske, 2005). GAD is also associated with more days of work missed, less productivity at work, and more doctor visits than any other psychological disorder, including depression (Allgulander, 2006). GAD is highly comorbid with major depression and other anxiety disorders, such as panic disorder and social phobia (Kessler et al., 1996). In addition, GAD is associated with interpersonal problems even after the overlap with depressive symptoms has been statistically controlled (Stein & Heimberg, 2004). Despite extensive research, GAD remains the most difficult to understand and treat of the anxiety disorders (Brown, Barlow, & Liebowitz, 1994; Weston & Morrison, 2001). One possible hypothesis for this difficulty is that the nature of worry in GAD does not lend itself as well to exposure therapy as other anxiety disorders because its content is diffuse, ever-changing, and based on future-oriented apprehension that occurs in the absence of true threat (Borkovec, 2002). In conclusion, GAD is a serious clinical problem that warrants further attention. To better
understand and treat GAD, it is crucial to extend knowledge of worry as the cardinal symptom of GAD.

*Psychophysiological Characteristics and Consequences of Worry*

In addition to psychological distress, worry and GAD have psychophysiological consequences. Initial investigations of the psychophysiological properties of worry and GAD indicate that exposure to worry stimuli results in an atypical pattern of responding compared to that elicited by exposure to feared stimuli (Borkovec, 1994). Individuals asked to engage in worry about an upcoming public speech showed significantly lower heart rate reactivity than those asked to engage in neutral thinking about the speech (Borkovec, 1994). This finding differs from the pattern found in other anxiety disorders (e.g., posttraumatic stress disorder, Blanchard, 1990; social anxiety disorder, Gramer & Saria, 2007) of heightened heart rate reactivity in anticipation of exposure to feared stimuli. Thayer, Friedman, and Borkovec (1996) investigated more completely the psychophysiological properties of worry by studying elements of the parasympathetic branch of the autonomic nervous system. They recorded cardiovascular responses of individuals with GAD and non-anxious controls during baseline, relaxation, and worry periods. Individuals with GAD demonstrated significantly lower heart rate variability than non-anxious controls across all three experimental periods, suggesting that worry is associated with lower cardiac flexibility (Thayer et al., 1996). The experience of chronic worry, therefore, appears to be related to deficits in vagal tone. Heart rate variability has been hypothesized to be related to poor attentional control and emotion regulation (Friedman & Thayer, 1998).
Understanding Worry Inside and Outside the Context of GAD

Ruscio and colleagues have investigated the full spectrum of pathological worry by distinguishing between non-anxious controls and high-worrying individuals who fail to meet full criteria for GAD. Ruscio (2002) examined two large samples of undergraduates and compared high worriers to those who meet full criteria for GAD. Both groups demonstrated similarly elevated scores on a measure of self-reported worry, but non-GAD high-worriers tended to be distinguishable from their GAD counterparts on criteria A (excessiveness and uncontrollability of worry) and E (subjective distress and impairment from worry) of the DSM-IV (APA, 1994) criteria set for GAD. Ruscio (2002) hypothesized that GAD might, therefore, be associated with higher emotional disturbance than high worry alone. This work is important in understanding the boundaries between the normal process of worry and the impact of more frequent and impairing worry found both in individuals with GAD and those pathological worriers who do not meet full criteria for the diagnosis.

Ruscio and Borkovec (2004) compared a sample of individuals with GAD to non-GAD worriers matched on severity of worry. GAD worriers experienced significantly more negative intrusions after a worry induction as well as increased superstitious beliefs about the power of worry. The authors also concluded that both GAD and non-GAD worriers tend to monitor their thoughts more often than non-anxious controls. The authors suggest further investigation of variables that differentiate high worry inside and outside the context of GAD to inform treatment for the full spectrum of pervasive worry.

Theoretical Perspectives on Worry and GAD

Borkovec and colleagues’ decades of work investigating the nature of problematic worry in GAD have led to the development and refinement of the avoidance theory of worry. The
theory posits that worry serves an avoidance function in that it allows individuals to escape from the arousal related to diffuse, hypothetical, and future-oriented anxious thoughts from which they otherwise have no behavioral escape (Borkovec, 1994; Borkovec, Alcaine, & Behar, 2004). This hypothesis is consistent with the emotional processing theory of the maintenance of fear (Foa & Kozak, 1986), which has its roots in Lang’s (1979) bio-informational theory. Borkovec (1994) suggests that worry prevents exposure to the full fear structure because it denies the individual exposure to aversive images and associated negative affect and thus maintains the subjective experience of anxiety. This avoidance theory provides a framework of understanding for worry as a pathological process that allows individuals to avoid emotionally-arousing stimuli—and therefore further negative affect—in the short term, but it prevents them from fully accessing these stimuli and thus prevents extinction of the feared stimuli in the long term.

Three more recent theories have developed out of Borkovec’s avoidance theory of worry. Mennin, Heimberg, Turk, and Fresco (2002, 2005; Mennin, Fresco, Heimberg, & Ritter, 2009) have attempted to address how one’s experience of emotions could be aversive and thus lead to the use of worry in service of the avoidance of emotional experiences. They suggest that individuals with GAD have trouble recognizing, experiencing, communicating, and tolerating their emotions and therefore use worry as a way to control, avoid, or dull their emotional experiences. Individuals with GAD thus get caught in a spiral of worry that prevents them from attending to their emotional experience in a manner that allows for effective problem-solving strategies. In addition, individuals with GAD have difficulty differentiating between problems that need to be solved and worries that are unlikely to occur. Salters-Pedneault, Roemer, Tull, Rucker, and Mennin (2006) provided preliminary evidence of emotion regulation difficulties in an undergraduate sample of high-worriers (see also Mennin et al., 2005, and Turk, Heimberg,
Luterek, Mennin, & Fresco, 2005). Several aspects of emotion dysregulation (e.g., acceptance of emotions; impulse control) were related to severity of self-reported worry. This effect remained significant when general affective distress was statistically controlled. This finding suggests utility in further investigation of emotion regulation difficulties in high worriers.

Like the emotion dysregulation model of GAD, the acceptance-based conceptualization of GAD (Roemer & Orsillo, 2002, 2005) builds on Borkovec’s avoidance theory of worry. The authors suggest that individuals with GAD have an attentional bias toward threat that has been fueled by focusing on hypothetical future events. In addition, individuals with GAD tend to believe that worry will prevent negative outcomes. Taken together, an attentional bias towards threat and a belief that worry is helpful can result in experiential avoidance, lack of acceptance of emotional experience, and rigid behavior. Therefore, GAD is maintained because individuals have a lack of awareness and acceptance of internal events and use worry to avoid contact with the negative affect associated with these internal events.

Finally, Newman and Llera (2011) describe a theory that specifies the mechanism of experiential avoidance of negative emotion in worry as avoidance of negative contrast. They posit that individuals with GAD prefer being prepared for the likelihood of a negative or even catastrophic event and therefore tolerate the negative affect (i.e., worry) associated with this preparation rather than managing the contrast from a euthymic to a negative state in the unlikely event that their feared consequence occurs. These authors suggest that targeting avoidance of negative contrast in treatment would allow full activation of the fear structure to achieve emotional processing and, thus, habituation to the feared negative stimulus.

In summary, worry is a normal part of human functioning that can sometimes become pathological. When worry becomes excessive and uncontrollable, it affects several aspects of
psychological and physiological health and interferes with one’s general well-being. Several related theoretical perspectives suggest that worry is manifested and maintained through avoidance of aversive cognitive and emotional stimuli by focusing instead on hypothetical future-oriented scenarios. Dysregulation of emotional processes and a lack of acceptance and awareness of emotional experiences follow. The current study aims to better understand the relationship between worry and mindfulness, a process hypothesized to be antithetical to worry.

Mindfulness as a Concept and Process

What is Mindfulness?

The psychological construct of mindfulness has received increased attention over the past several decades. Mindfulness has its roots in Buddhist and contemplative philosophy, although its application to western psychology does not espouse any religious affiliation. Mindfulness, taken from the Sanskrit word dharma, refers loosely in Buddhism to “the way things are” (Kabat-Zinn, 2003, p. 145). Kabat-Zinn (1994) describes the Buddhist perspective of mindfulness as a way to wake up from the automatic nature of our lives through careful self-reflection to live a fuller, more present life. Kabat-Zinn (2003) provides a working definition of mindfulness as “the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment” (p. 145). Alternatively, Bishop et al. (2004) define mindfulness as “the self-regulation of attention so that it is maintained on immediate experience, thereby allowing for increased recognition of mental events in the present moment” that involves “adopting a particular orientation toward one’s experiences in the present moment, an orientation that is characterized by curiosity, openness, and acceptance” (pp. 232-233). Kabat-Zinn (2003) describes mindfulness as being not just Buddhist but rather uniquely human. The migration of mindfulness practice to the west
represents a paradigm shift of significance, and mindfulness has substantially impacted western psychology in recent decades.

*The Process of Mindfulness Meditation*

Several researchers have attempted to conceptualize the process of mindfulness meditation as it relates to traditional psychotherapy. Shapiro, Carlson, Astin, and Freedman (2006) term the shift in perspective that occurs during the mindfulness process *reperceiving*, in which one learns to “disidentify from the contents of consciousness…and view his moment-by-moment experience with greater clarity and objectivity” (p. 377). This process allows the person to step away and observe his or her experience from a distance. Shapiro et al. (2006) suggest that reperceiving—the idea of seeing one’s experience as objective—is a natural part of human development that becomes more highly refined through meditation practice. Distancing from our experience helps us to view ourselves as more than just that experience. Reperceiving also allows for a reduction in experiential avoidance, the fear of the internal experience of negative emotions (Hayes et al., 2004), because we become more willing to tolerate a full range of emotions.

Shapiro et al. (2006)’s description of reperceiving is conceptually similar to *decentering* (Fresco et al., 2007; Safran & Segal, 1990). Safran and Segal (1990) define decentering as the “ability to observe one’s thoughts and feelings as temporary, objective events in the mind, as opposed to reflections of the self that are necessarily true” (p. 117). The authors suggest that decentering is a necessary component of successful cognitive therapy for depression. Recent research in the area of mindfulness-based cognitive therapy for depression suggests that deficits in decentering are related to relapse of depression following a course of cognitive therapy (Segal, Williams, & Teasdale, 2002). In conclusion, both Shapiro et al. (2006) and Segal and colleagues
(2002; Safran & Segal, 1990) propose the integration of mindfulness meditation techniques with traditional therapy to achieve a more objective view of the self (i.e., reperceiving or decentering) that may lead to better overall psychological health.

Mindfulness as a Component of Psychotherapy

Mindfulness-based stress reduction (MBSR)

A substantial body of literature has accumulated over the past 20 years demonstrating support for Jon Kabat-Zinn’s Mindfulness Based Stress Reduction (MBSR) program (see Baer, 2003, and Grossman, Niemann, Schmidt, & Walach, 2004, for reviews). The manualized MBSR program (previously called the stress reduction and relaxation program) began as an adjunct treatment for chronic pain in a behavioral medicine setting (Kabat-Zinn, 1982; Kabat-Zinn, Lipworth, & Burney, 1985; Kabat-Zinn, Lipworth, Burney, & Sellers, 1987). MBSR is not intended to be a traditional medical or psychological treatment; rather, it simply teaches meditation to achieve better health (Brantley, 2004). The typical MBSR course consists of an 8-10 week structured program delivered in a group format. Each session lasts 2-2½ hours with the exception of one full day (7-8 hours) of meditation that usually occurs during the 6th week. The program includes the teaching of mindfulness meditation skills (i.e. body scan, walking meditation, sitting meditation, and eating meditation) and discussions of coping with stress and compliance with homework. Participants are asked to devote 45 minutes per day to meditation practice throughout the duration of the program (Kabat-Zinn, 1982).

As evidence has accumulated demonstrating the overall health benefits related to the MBSR program, investigators have begun to conduct randomized-controlled trials with specific target populations. In particular, MBSR has demonstrated efficacy in a sample of individuals with either GAD or panic disorder (Kabat-Zinn et al., 1992). Participants demonstrated
significant reductions in self-reported symptoms of anxiety and depression directly following the MBSR program, and these gains were maintained after 3 months.

Mindfulness-based cognitive therapy for depression

Consistent with the belief that depressed individuals need to develop a more objective—or decentered—view of the self, Segal et al. (2002) proposed a program of mindfulness-based cognitive therapy (MBCT) for prevention of relapse in once-depressed individuals who have received cognitive therapy. The authors hypothesized that patients would be less vulnerable to relapse if they were to develop a fuller awareness of the full range of emotional experiences through moment-by-moment attention. MBCT typically consists of an 8-week program delivered in a group format in weekly 2-hour sessions. Participants are instructed through group discussion and homework assignments to develop a more decentered perspective on thoughts and feelings (Segal, Teasdale, & Williams, 2004). They are challenged to live more in being mode rather than doing mode (Teasdale, 1999).

MBCT has demonstrated efficacy in preventing relapse of depression following a course of cognitive therapy. One hundred forty-five patients in remission from major depression were randomized to receive either MBCT or treatment as usual (TAU, which consisted of pharmacotherapy with antidepressant medication), and their symptoms of depression were assessed over an 8-week period (Teasdale et al., 2000). Forty percent of patients who received MBCT relapsed to major depression compared with 66% in the TAU group. Ma and Teasdale (2004) demonstrated a similar decrease in relapse to depression in a replication study. Kuyken et al. (2008) further replicated these findings and demonstrated that MBCT is as cost-effective as maintenance pharmacotherapy in preventing relapse to depression. These studies suggest that the
practice of mindfulness skills can protect against relapse in patients with partially-remitted major depression (Segal et al., 2004).

Mindfulness-based approaches to the treatment of GAD

Preliminary support has recently been demonstrated for the efficacy of MBCT for individuals with GAD. Evans et al. (2008) conducted a small pilot study ($N = 11$) in which individuals with GAD demonstrated decreases in worry, tension, and depression following an 8-week MBCT course. They also experienced a trend toward a significant increase in mindful awareness following MBCT. In addition, Craigie, Rees, Marsh, and Nathan (2008) conducted an open trial of 23 individuals with GAD who participated in a 9-week MBCT program. Participants demonstrated significant improvements on worry, anxiety, quality of life, and stress following the MBCT program, thus replicating the results of Evans et al. (2008). However, Craigie et al. (2008) pointed out that the effect size for the study was relatively small compared to trials of cognitive-behavioral therapy for GAD. Taken together, these results indicate that MBCT could be a useful treatment for individuals with GAD, but more sophisticated randomized-controlled trials need to be conducted to better understand the efficacy of MBCT for GAD.

In addition, promising evidence in support of Acceptance-Based Behavior Therapy (ABBT) for GAD has been demonstrated in two recent investigations. Roemer and Orsillo (2007) conducted a small open trial ($n = 16$) of ABBT for individuals with GAD. Measures of worry, depression, quality of life, and experiential avoidance were examined pre-, post-, and 3 months following treatment with ABBT. All measures demonstrated significant change over time. To evaluate clinical significance, the authors calculated the percentage of participants who met criteria for classification as responders (75%) and as having achieved high-end state
functioning (62.5%) at post-treatment. At 3 month follow-up, 50% were responders and 50% had achieved high-end state functioning (when those who failed to come in for follow-up were carried forward from their assessment at post-treatment). The authors noted that one factor hypothesized to maintain GAD—fear of internal emotional experiences—was reduced from pre- to post-treatment, indicating that this treatment may work in the way they intended it to.

The authors next examined the efficacy of ABBT for GAD in a small randomized controlled trial (Roemer, Orsillo, & Salters-Pedneault, 2008). Thirty-one participants who met DSM-IV-TR (APA, 2000) criteria for GAD were randomly assigned to ABBT or a minimal attention control waitlist. After 16 weeks, the majority (77%) of individuals who received ABBT showed good end-state functioning and no longer met criteria for GAD, compared to 17% of the waitlist controls. Participants who received ABBT demonstrated significantly larger decreases in clinician-rated symptoms of GAD ($d = 1.32, p < .001$), worry ($d = 1.02, p < .001$), stress ($d = 0.92, p < .002$), and depression ($d = 1.06, p < .001$) compared to those in the waitlist condition. In addition, individuals who received ABBT demonstrated significantly larger decreases in experiential avoidance and increases in self-reported mindfulness. Taken together, these preliminary data suggest that ABBT shows promise in treating individuals with GAD. However, the trial utilized a waitlist control design. Future studies should evaluate ABBT against more stringent control conditions and alternative treatments to better understand the efficacy of this new approach in helping to alleviate overall distress and improve quality of life for individuals with GAD.

**The Use of Mindfulness Techniques in a Laboratory Setting**

Despite a recent flurry of research investigating the inclusion of mindfulness practice in existing therapy protocols, relatively little research exists demonstrating the mechanisms of
mindfulness practice in a laboratory setting. One recent study examined the impact of a 15-minute mindfulness breathing exercise on the ability of participants to express and evaluate emotional responses to visual stimuli (Arch & Craske, 2006). Participants were assigned to one of three conditions: focused breathing (a mindful breathing exercise), worry induction, or control. Participants were exposed to the experimental manipulation for 15 minutes prior to watching a series of positive, negative, and neutral visual stimuli. Individuals in the focused breathing group responded more positively to neutral stimuli than the worry or control groups. In addition, those in the mindfulness condition reported significantly less negative affect following the negative stimuli than those in the worry or the control conditions.

Two other studies have examined the use of a laboratory mindfulness practice in conjunction with negative mood induction in the study of rumination. Broderick (2005) examined 177 undergraduates who were randomly assigned to one of three conditions (rumination, distraction, or mindfulness) following a negative mood induction. Those in the distraction condition were asked to think of topics not related to the sad topics in the mood induction. Those in the rumination condition were asked to think about self-focused statements related to the sad mood induction. Those in the mindfulness condition were asked to listen to a short guided meditation script that focused on awareness of breath and acceptance of self. Participants in the mindfulness condition demonstrated significantly lower dysphoria compared to the participants in the rumination or distraction conditions.

Huffziger and Kuehner (2009) examined rumination during a mood induction in a sample of individuals with a history of severe depression. A subset of participants (N = 76) who were involved in a larger longitudinal study examining chronic depression were invited to participate. All participants had been discharged from inpatient treatment for depression 3.5 years prior.
Participants were assigned to one of three conditions, similar to Broderick (2005): rumination, distraction, or mindful self-focus (a brief mindful breathing exercise). Participants assigned to the mindful self-focus group demonstrated greater alleviation of the induced negative mood than those instructed to engage in rumination. In addition, higher trait levels of mindfulness predicted greater improvement from the negative mood induction in the mindful self-focus condition. Although mindfulness is typically conceptualized as a process or a way of life and these studies do not claim to mimic the complex process of formal mindfulness practice, these initial examples of experimental procedures suggest that mindfulness induction techniques implemented in the laboratory can have positive effects and further suggest that they may be a useful avenue for examination of the mechanisms by which mindfulness inductions have their effects.

Expressive Writing as Emotional Exposure

Review of Expressive Writing as a Therapeutic Process

Several decades of literature have accumulated since Pennebaker and Beall’s (1986) seminal work in the area of expressive writing and health. The authors first noted, based on preliminary research, that individuals who had experienced a traumatic event and chose not to disclose it to others were more likely to report health problems. Disclosing the experience of a traumatic event was thought to help people organize, confront, and make meaning out of the experience, eventually leading to their subsequent overcoming of the traumatic experience. This hypothesis is consistent with Foa and Kozak’s (1986) theory of emotional processing of fear, discussed earlier. Pennebaker and Beall’s (1986) initial investigation involved 46 undergraduates who participated in 4 consecutive days of writing. Participants were randomly assigned to one of four conditions: control, trauma-fact (writing about the facts of their most troubling past experience), trauma-emotion (writing about their feelings surrounding their most troubling past
experience), and trauma-combination (writing about both facts and feelings). Overall, participants in both the trauma-emotion and the combination group demonstrated increases in physiological arousal across the writing sessions. They also experienced long-term health benefits including fewer health center visits and lower self-reported health difficulties six months later.

This general expressive writing paradigm has been tested and reformulated over the years to demonstrate efficacy in a variety of populations and timeframes (see Sloan & Marx, 2004; Smythe, 1998, for reviews). The basic experimental design typically compares expressive writing (i.e. “write about your deepest thoughts and feelings about an extremely emotional issue that has affected your life…really let go and explore your deepest thoughts and emotions,” Pennebaker, 1997, p. 162) to control writing (i.e. “write about everything you did today from the time you woke up until now”). In addition to a variety of physiological and self-report indices suggesting overall health benefits from expressive writing, Pennebaker, Francis, and Booth (2001) launched a computer program called the Linguistic Inquiry and Word Count (LIWC), which analyzes the change in word content of writing samples across time. This program allows for another measure of progress by examining, for example, an increase in positively-valenced words across time.

Proposed Theoretical Underpinnings of Expressive Writing

Recent work by Sloan and colleagues (e.g., Sloan & Marx, 2004; Sloan, Marx, & Epstein, 2005; Sloan, Marx, Epstein, & Lexington, 2007) has attempted to clarify the theoretical process underlying the consistent finding that expressive writing is related to health benefits. Sloan and colleagues have demonstrated support for the hypothesis that expressive writing is akin to the emotional processing of fear-related stimuli inherent in exposure therapy. Sloan et al.
(2007) found that participants randomly assigned to an expressive writing condition that emphasized emotional expression demonstrated significant improvements on measures of psychological and physical health compared to those who had instructions that emphasized insight or those in a control condition. In addition, Brody and Park (2004) hypothesized that expressive writing is itself a “mindful” process because it allows for focused attention to a specific emotional stimulus. The present study examined Brody and Park’s (2004) hypothesis in the context of Sloan et al. (2007)’s instructions for expressive writing that emphasize emotional expression.

**Expressive Writing and Anxiety**

Relatively few studies have directly examined the relationship between expressive writing and symptoms of anxiety or the impact of the expressive writing process on worried individuals. Harvey and Farrell (2003) examined the effectiveness of expressive writing about stress topics before bedtime in a sample of individuals with insomnia. Participants were randomly assigned to write about “problems” or “hobbies” for 3 consecutive nights, or they were assigned to a no-writing control group. Participants in the “problems” group were instructed to write about their “deepest thoughts and feelings about something that is emotionally important and bothering [them] at the moment.” The authors found that writing expressively about problems was significantly related to a decrease in time to sleep onset.

Goldman, Dugas, Sexton, and Gervais (2007) examined the effect of expressive writing on a non-clinical group of high-worrying individuals. Participants were randomly assigned to write for 3 consecutive days in either an expressive writing or a control writing group. Those in the expressive writing group were asked to write about their “worst fear coming true with as much emotion as possible.” Individuals in this group demonstrated significant decreases over time on
self-report measures of worry, depression, and somatic symptoms compared to individuals in the control writing group. Goldman et al. (2007) provide initial support for the efficacy of expressive writing for non-clinical high-worriers.

Expressive Writing as a “Mindful” Process

The process of experimental expressive writing interventions typically asks participants to “really let go” and ignore rules of grammar, spelling, and syntax to focus fully on the emotional experience of writing. Brody and Park (2004) suggest that this process in itself can be conceptualized as mindful awareness. The present study evaluates the nature of mindfulness inherent in engaging in an expressive writing task by examining facets of mindfulness both at baseline and directly following an expressive writing session.

In addition to examining expressive writing as a mindful process, Brody and Park (2004) suggest that future studies should examine varying instructions for expressive writing to better understand underlying mechanisms, as outlined by Sloan and Marx (2004). One recent investigation examined the impact of varying instructions for expressive writing to focus more on acceptance and mindfulness of emotions. Researchers varied the writing instructions to be either evaluative or accepting (Low, Stanton, & Bower, 2008). The evaluative condition instructed participants to focus on aspects of the experience in which they found judgment in the content of their emotions. The acceptance condition instructed participants to focus on the acceptance of their emotions as a normative reaction to a difficult situation. Individuals given instructions to be more accepting of their emotional experience demonstrated better habituation of heart rate reactivity than those given instructions to be more evaluative of their emotional experience. In addition, Low et al. (2008) examined changes in word content but failed to find predicted differences in the frequency of use of positive or negative emotion words. They
suggested that this hypothesized difference in positive and negative word content be revisited in future studies and that measures of state mood be included to better understand the change in heart rate reactivity during the expressive writing process. The current study builds on the work by Brody and Park (2004) and Low et al. (2008) by examining several variables related to mindfulness and acceptance of one’s emotional experience and their relationship to the content of expressive writing about idiographic worry topics.

Present Study

Aims of the Present Study

The current study examined the addition of a mindfulness practice exercise to the written disclosure paradigm (Pennebaker & Beall, 1986; Pennebaker, 1997) in a sample of high-worrying college students. The study employed a 2 (writing group: expressive writing, control) x 2 (practice condition: mindfulness, relaxation) x 2 (time-point: pre-treatment, follow-up) design for trait variables and a 2 (writing group: expressive writing, control) x 2 (practice condition: mindfulness, relaxation) x 3 (writing session: day 1, day 2, day 3) design for state variables (see Figure 1).

<table>
<thead>
<tr>
<th>Practice Condition</th>
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<td>Expressive (EW)</td>
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<td>Relaxation (RP)</td>
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<td>Mindfulness (MP)</td>
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Figure 1. Randomization conditions for the 2 (writing condition) X 2 (practice condition) of the present study.
Participants were randomly assigned to participate in a brief orientation to and practice of a mindfulness exercise or a control (relaxation) exercise. Participants were then randomly assigned to either the expressive or control writing group. They listened to the mindfulness (or relaxation) exercise and then participated in 3 consecutive days of writing for 20 minutes each day. The current study assessed changes in mindfulness, emotion regulation, and psychopathology prior to and one month after the period of expressive writing. In addition, the current study examined state levels of mindfulness, anxiety, and negative affect as well as an analysis of word content following the completion of each of the three writing sessions. This study examined several primary and secondary hypotheses (discussed below).

**Primary Hypotheses**

*Effect of Mindfulness Practice and Expressive Writing from Pretreatment to Follow-up*

The first set of hypotheses was formulated to examine psychological benefits of mindfulness and expressive writing in a sample of high worriers from pre-treatment to follow-up. It was predicted that individuals in the EW conditions would demonstrate significantly larger decreases in measures of worry, depression, and GAD severity from pre-treatment to follow-up compared to those in the CW conditions (*Hypothesis 1a*). The same pattern of results was predicted for individuals in the MP conditions compared to the RP conditions (*Hypothesis 1b*). Finally, a significant interaction effect was predicted, in that individuals in the EW + MP condition would show the greatest decreases in measures of worry, depression, and symptoms of GAD from pre-treatment to follow-up relative to individuals assigned to the other three conditions (*Hypothesis 1c*).

Individuals in the EW conditions were expected to demonstrate greater increases in the five facets of mindfulness (nonreactivity, aware, observe, describe, and nonjudging) from pre-
treatment to follow-up compared to participants in the CW conditions (*Hypothesis 2a*). The same predication was made for individuals in the MP conditions compared to those in the RP conditions (*Hypothesis 2b*). In addition, it was predicted that participants in the EW + MP condition would demonstrate greater increases in the five facets of mindfulness from pre-treatment to follow-up compared to participants in the other three conditions (*Hypothesis 2c*).

Similarly, it was predicted that individuals in the EW conditions would demonstrate greater decreases in difficulty with emotion regulation and experiential avoidance and greater increases in decentering from pre-treatment to follow-up compared to participants in the CW conditions (*Hypothesis 3a*). This pattern of results was also expected for those in the MP conditions compared to those in the RP conditions (*Hypothesis 3b*). A significant interaction effect was also predicted such that individuals in the EW + MP condition would show the greatest decreases in emotion dysregulation and experiential avoidance and the greatest increases in decentering from pre-treatment to follow-up compared to those in the other three conditions (*Hypothesis 3c*).

*Session-by-session Changes in Positive and Negative Affect and Anxiety*

A second set of hypotheses were formulated to examine session-to-session changes in positive and negative affect following the three writing sessions. It was predicted that individuals in the EW conditions compared to those in the CW conditions would demonstrate significantly larger decreases across sessions in negative affect and state anxiety and significantly larger increases in positive affect (*Hypothesis 4a*). The same pattern of results was expected for participants assigned to the MP conditions compared to those in the RP conditions (*Hypothesis 4b*). Finally, a significant interaction effect was predicted, such that participants in the EW + MP condition would demonstrate the greatest decreases across sessions in negative affect and state...
anxiety as well as the largest increases in positive affect relative to participants in the other three conditions (Hypothesis 4c).

Evaluation of Expressive Writing as “Mindful” Process

Hypothesis 5. Next, the hypothesis proposed by Brody and Park (2004), that expressive writing is itself a “mindful” process, was examined. It was predicted that individuals in the two EW conditions would demonstrate significantly larger increases in trait mindfulness across writing sessions than individuals in the two CW conditions (Hypothesis 5a). Additionally, it was predicted that individuals in the EW + MP condition would demonstrate significantly larger increases across sessions in state mindfulness relative to participants in the other three conditions (Hypothesis 5b). To specifically test the hypothesis proposed by Brody and Park (2004), it was predicted that participants in the EW + RP condition would demonstrate significantly higher state mindfulness scores than participants in the CW + RP condition (Hypothesis 5c). The two relaxation groups were analyzed separately to account for the effect of the mindfulness practice.

Relationship between GAD Status and Aspects of Mindfulness and Emotion Regulation

Hypothesis 6. To build upon Ruscio and Borkovec’s (2004) work understanding differences between individuals with GAD and non-GAD high-worriers, the current study examined a subset of the sample who met full criteria for GAD (based on exceeding a cut-off of 5.7 on the Generalized Anxiety Disorder Questionnaire for DSM-IV, Newman et al., 2002). Ruscio and Borkovec (2004) found that individuals with GAD demonstrated more difficulty with emotional expression. It was predicted that individuals who met criteria for GAD would show significantly greater deficits in emotion regulation compared to those high worriers who did not meet criteria for GAD.
It was also predicted that all individuals who suffer from pathological worry—and not just those who meet full criteria for GAD—would tend to be future-focused and judgmental of their emotional experience (Borkovec, 2002). Therefore, no significant difference in scores on measures of the “nonjudging of inner experience” and “awareness” facets of mindfulness based on GAD diagnostic status was expected. However, these measures of facets of mindfulness were expected to be significantly and negatively correlated with a measure of pathological worry (Hypothesis 7).

Examination of Word Content from Writing Narratives

Finally, a series of hypotheses were formulated to assess changes across sessions in word content. To examine frequency of verbs in the present, past, and future tense, only the individuals in the expressive writing conditions were examined. This was done to avoid the confounding influence of a discrepancy in tense of the writing instructions. Control writing instructions asked participants to write about daily experiences in the past tense while expressive writing instructions asked participants to write freely about a worry topic. It was predicted that participants in the EW + MP condition compared to those in the EW + RP condition would demonstrate a greater increase in present-tense verbs and a greater decrease in future-tense verbs and past-tense verbs across sessions (Hypothesis 8). The subset of participants who engaged in expressive writing was also used to assess word content related to being nonjudgmental, a central variable of interest in assessing the relationship between mindfulness and expressive writing. It was also predicted that individuals in the EW + MP conditions compared to those in the EW + RP conditions would have fewer insight words (e.g., think, know, consider), and discrepancy words (e.g., should, could; Hypothesis 9).
The full sample was used to analyze word content for positive emotion, negative emotion, and anxiety words. It was expected that the EW conditions would use fewer negative emotion and anxiety words and more positive emotion words over time compared to the CW conditions (Hypothesis 10a). It was also expected that the MP conditions would demonstrate the same pattern relative to the RP conditions (Hypothesis 10b). Finally, it was expected that the EW + MP group would show greater decreases in negative emotion words and anxiety words and greater increases in positive emotion words across sessions than those in the other conditions (Hypothesis 10c).

Hypothesis 11. Further a priori predictions were made about the nature of the word content analysis in relation to individuals’ trait mindfulness. It was predicted that a higher pre-treatment level of “non-judging of inner experience” would be associated with a lower number of discrepancy, causation, and insight words included in each of the three writing samples.

Hypothesis 12. Finally, it was predicted that frequency of positive emotion words, negative emotion words, and anxiety words following each writing session would be correlated with state measures of positive emotion, negative emotion, and anxiety, respectively.
CHAPTER 2

METHOD

Participants

Participants were undergraduate students enrolled in psychology and related courses at Temple University. Potential participants completed the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990; see below) as part of a screening packet of questionnaires in exchange for research credit. Students who met or exceeded a cut-off score of 59 on the PSWQ were contacted for participation in the proposed study in exchange for additional research credit or monetary compensation. They were told that participation in this study included learning coping strategies for dealing with worry, writing expressively about a worry topic for 20 minutes per day for 3 consecutive days, and filling out a series of questionnaires. They were provided with a selection of research projects from which to choose and told that participation in this study was optional. Participants received either 1 research credit or $10 per hour of participation in this study. More specifically, they received one research credit (or $10) for completion of the initial battery of questionnaires, 2 research credits (or $20) at the conclusion of the three days of writing, and 1 research credit (or $10) for completion of the follow-up questionnaires, for a total of 4 research credits or $40.

One hundred thirty-seven potential participants who signed consent and agreed to participate started the study. A portion of these participants (n = 3) did not return for any of the writing sessions and were thus dropped from further consideration. Another group of participants (n = 20) was dropped from the study because of data collection errors [e.g., inadvertent delivery of instructions for two different conditions on consecutive writing days (n = 3), accidental deletion of questionnaire data from the online research participation server (n = 15), failure to
properly save writing samples \((n = 2)\). Finally, a group of participants \((n = 7)\) who had scored above the screening cut-off of 59 on the PSWQ scored at least one standard deviation below that cut-off when they completed the PSWQ during the first laboratory session. Therefore, these participants were not included in the final sample. The final sample \((N = 107)\) does contain some participants \((n = 4)\) who failed to complete the follow-up questionnaires and some participants \((n = 5)\) who missed one day of writing. Procedures for handling missing data are described below.

To examine potential differences between individuals who were included in the final analysis and those who were not, an independent samples \(t\)-test was conducted to compare the mean score of the PSWQ collected when individuals were screened for the study. There was no difference in PSWQ scores between these two groups, \(t(136) = -1.43, p = .16\). In addition, there was no difference in age between those included in the sample and those not \([t(110) = -0.39, p = .70]\). There were too few cases to accurately examine differences on other demographic variables between those participants included in the final sample and those not included.

The sample was predominantly female \((n = 87, 81.3\%)\) with a mean age of 19.85 \((SD = 2.61)\). The ethnic make-up of the study sample was predominantly Caucasian \((n = 76, 71\%)\); other participants self-identified as 6% African-American, 13% Asian, 3% Hispanic, and 7% mixed race. The sample identified most often with being exclusively heterosexual \((n = 83, 78.3\%)\), with the remaining 21.7% identifying as homosexual, bisexual, or having some homosexual experience.

**Measures**

**Screening Measure**

The *Penn State Worry Questionnaire (PSWQ)*: Meyer et al., 1990) is a 16-item self-report inventory that assesses the tendency to worry excessively and uncontrollably. Individuals rate
how well statements describe them using a 5-point Likert-type scale ranging from 1 (not at all typical of me) to 5 (very typical of me). Sample items include “my worries overwhelm me” and “I worry about projects until they are finished.” In undergraduate samples, the PSWQ has demonstrated high internal consistency (Cronbach’s $\alpha = .91-.95$; Meyer et al., 1990) and good test-retest reliability over ten weeks ($r = .92$; Meyer et al., 1990). The PSWQ has shown itself to be highly correlated with other self-report measures of worry, such as the Worry Domains Questionnaire ($r = .57$; Davey, 1993). In addition, the PSWQ has demonstrated high internal consistency (Cronbach’s $\alpha = .93$) and ability to distinguish individuals with GAD from those with other anxiety disorders in a clinical sample seeking treatment at an anxiety specialty clinic (Brown, Antony, & Barlow, 1992). Items on the PSWQ are added for an overall total score that ranges from 16 to 80. Higher scores on the PSWQ indicate greater severity of worry.

The PSWQ was chosen as the screening questionnaire for this study because it has demonstrated good construct validity for detecting worry (Brown et al., 1992). In addition, the PSWQ has demonstrated good predictive validity in detecting individuals with DSM-IV (APA, 1994) GAD (Behar, Alcaine, Zuellig, & Borkovec, 2003; Fresco, Mennin, Heimberg, & Turk, 2003). A cut-off score of 56 was found to be 1 standard deviation below the mean of individuals diagnosed with GAD using a structured clinical interview (see Molina & Borkovec, 1994), suggesting that value is a good measure of non-treatment-seeking pathological worry.

In addition, the experimenter examined data from the fall 2008 semester Temple University undergraduate self-report questionnaire database to estimate the anticipated mean of the sample in the proposed study. Six-hundred thirteen students completed the PSWQ ($M = 47.88$, $SD = 14.06$), suggesting that a score one standard deviation above the mean would be 62. Examining this same dataset using a cut-off score of 62, however, yielded 111 cases that fell
above the cut-off, a number too small to guarantee adequate recruitment to complete the planned analyses. To optimize access to high-worrying participants, the experimenter combined the cut-off score estimated by the Temple fall 2008 screening database \((M = 62)\) data with the cut-off estimated by Molina and Borkovec (1994; \(M = 56)\) for a final cut-off score of 59, the value that falls between the two estimates discussed above. Therefore, individuals who scored 59 or higher on the PSWQ were invited to participate in the current study.

Trait Measures

The Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004) is a 9-item self-report inventory designed to measure experiential avoidance. Respondents rate the degree to which each statement applies to them on a Likert-type scale \((1 = never \, true\) to \(7 = always \, true)\). The AAQ includes items such as “if I could magically remove all the painful experiences I’ve had in my life, I would do so” and “anxiety is bad.” The AAQ has demonstrated adequate internal consistency, ranging from .89 - .92 in a clinical sample to .70 in a non-clinical sample (Zvolensky & Forsyth, 2002). Higher scores on the AAQ indicate higher levels of experiential avoidance. Scores are determined by totaling the scores on all items, providing a range of 9 to 63.

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item self-report measure intended to assess emotion dysregulation. Factor analysis of the measure indicates that the DERS is comprised of six subscales: Non-acceptance of emotional responses (e.g., “When I’m upset, I feel guilty for feeling that way”), difficulties in engaging in goal-directed behavior (e.g., “When I’m upset I have difficulty focusing on other things”), impulse control difficulties (e.g., “When I’m upset, I lose control over my behavior”), lack of emotional awareness (e.g., “I pay attention to how I’m feeling.”), limited access to emotion regulation (e.g.,
When I’m upset, I believe that I will remain that way for a long time.”), and lack of emotional clarity (e.g., “I have difficulty making sense out of my feelings.”). Responses are made on a 5-point scale ranging from almost never to almost always. In a college sample, the DERS has shown good internal consistency for the scale as a whole (α = .93) as well as the subscales (αs > .80). Additionally, the DERS has shown good test-retest reliability over 4-8 weeks (ρt = .88, p < .01; Gratz & Roemer, 2004). The DERS shows good predictive validity in its ability to significantly predict frequency of two behaviors often associated with emotion dysregulation, self-harm (r = .20 in women and r = .26 in men) and partner abuse (r = .34 in men, ns in women). Scores on the DERS range from 36 to 180, and higher scores indicate higher deficits in emotion regulation.

The Generalized Anxiety Disorder Questionnaire-IV (GAD-Q-IV; Newman et al., 2002) is a 10-item self-report screening measure that assesses DSM-IV criteria for GAD. Questions address the presence of excessive worry more days than not over a 6 month period (criterion A), acknowledgement that the worry is difficult to control (criterion B), the endorsement of worry-related physical symptoms (criterion C), and a subjective rating of distress and interference resulting from the experience of worry (criterion E). Total scores range from 0 to 13, with a cut-off score of 5.7 suggesting probable GAD diagnostic status (Newman et al., 2002). This cut-off optimizes sensitivity (83%) and specificity (89%) of the GAD diagnosis. The GAD-Q-IV demonstrated good discriminant validity in that it was more highly correlated with the PSWQ (r = .66) than it was with a measure of social anxiety (r = .34) and posttraumatic stress (r = .30). The GAD-Q-IV cut-off of 5.7 is consistent with diagnostic patterns from a structured clinical interview for GAD and tends to be stable over a two-week period (Newman et al., 2002).
The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2008) includes 39 items that assess five facets of trait-mindfulness: observing, describing, acting with awareness, nonjudging of inner experience, and nonreactivity to inner experience. Items are rated on a 5-point Likert-type scale ranging from 1 (never or very rarely true) to 5 (very often or always true), and higher scores indicate higher levels of the facets of mindfulness.

The theory of mindfulness as a multifaceted construct is shared by several mindfulness researchers (e.g., Dimidjian & Linehan, 2003; Segal et al., 2002). This five-factor solution was established using a confirmatory factor analysis of several previously existing measures of different aspects of mindfulness. Each factor contains 7 or 8 items taken from previous measures of mindfulness that contain the highest factor loadings (Baer, Walsh, & Lykins, 2009). A confirmatory factor analysis resulted in a five-factor hierarchical factor structure (Baer et al., 2006). The facets of the FFMQ demonstrate good internal consistency (Cronbach’s αs = .75 -.91). The FFMQ demonstrates good predictive validity in that individuals enrolled in an MBSR class reported a significant increase on the FFMQ from pre to post-treatment (Carmody & Baer, 2008).

The Beck Depression Inventory-II (BDI-II; Beck, Steer & Brown, 1996) is a 21-item scale that measures the cognitive, affective, motivational, and physiological symptoms of depressive states. Each item is assessed in a 2-week timeframe on a 4-point scale ranging from 0 to 3. Total scores range from 0 to 63. In a sample of outpatients, the BDI-II demonstrated good test-retest reliability ($r = .93$). In addition, it showed good convergent and discriminant validity in that it was more positively correlated with a structured clinical interview of depression ($r = .71$) than a structured clinical interview for anxiety ($r = .47$; Beck, Steer, & Brown, 1996). In a
sample of depressed outpatients, the BDI-II showed high internal consistency (Cronbach’s $\alpha = .91$; Beck, Steer, Ball, & Renieri, 1996).

The Experiences Questionnaire (EQ; Fresco et al., 2007) is a 20-item self-report measure of decentering, a construct that refers to the “capacity to take a detached view of one’s thoughts and emotions” (Fresco et al., 2007, p. 234). Respondents are asked to rate how frequently they experience the circumstances reflected in each item on a 5-point scale ranging from 1 (never) to 5 (all the time). Sample items include “I remind myself that thoughts are not facts” and “I view things from a wider perspective.” Factor analyses suggest a unifactorial structure in both a nonclinical sample of undergraduates and a clinical sample of depressed individuals. The scale also demonstrated good internal consistency in the nonclinical sample ($\alpha = .83$). The EQ has also demonstrated good concurrent validity as indicated by a significant positive correlation with cognitive reappraisal and significant negative correlations with measures of depression, rumination, experiential avoidance, and emotion dysregulation (Fresco et al., 2007).

State Measures

The Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) is a 20-item self-report measure that measures dimensions of positive and negative affect. Respondents in the current study were asked to indicate how they felt “at the present moment” on a 5-point scale from 1 (very slightly) to 5 (extremely). The correlation between the NA and PA scales is low (ranging from -.12 to -.23; Watson et al., 1988), indicating that the two scales measure independent constructs. Internal consistency estimates for the scales using short or long-term (e.g., 1 month) instructional sets are good to excellent (Cronbach’s $\alpha$ range from .84 to .87). This instrument has shown excellent discriminant validity for positive and negative mood and sensitivity to mood fluctuations (Watson & Clark, 1997).
The Toronto Mindfulness Scale (TMS; Lau et al., 2006) is a brief measure of mindful awareness following a meditation period. It measures one’s capacity to be aware of one’s sensations, thoughts, and feelings with an attitude of curiosity and acceptance. Respondents are asked to rate the extent to which they endorsed each item during the previous meditation session on a 5-point Likert-type scale ranging from 0 (not at all) to 4 (very much). Total scores range from 0 to 40 and higher scores indicate higher levels of state mindfulness. The TMS can also be examined using two subscales that measure the constructs of curiosity and decentering. Sample items include “I remained open to whatever thoughts and feelings I was experiencing” and “I found myself observing unpleasant feelings without getting drawn into them.” Adequate internal consistency ($\alpha = .76$) has been reported.

The State-Trait Anxiety Inventory 7-item version (STAI-7) is a subset of items taken from the original STAI (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). These seven items loaded most highly on an anxiety content factor that resulted from a factor analysis designed to differentiate among the constructs of anxiety, depression, and negative affect on the original STAI (Bieling, Antony, & Swinson, 1998). Sample items include, “I get in a state of tension or turmoil as I think over my recent concerns and interests” and “I feel nervous and restless.” The STAI-7 had good internal validity in that study ($\alpha = .78$). In addition, it demonstrated good convergent validity in that it was more highly positively correlated with measures of anxiety (i.e., Beck Anxiety Inventory; Depression and Anxiety Symptom Scale [DASS], stress and anxiety subscales) compared to measures of depression (i.e., Beck Depression Inventory; DASS depression subscale).

*Linguistic Content Analysis*
The expressive writing narratives were analyzed for content using the Linguistic Inquiry and Word Content software program (LIWC; Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). The program was designed to systematically examine the emotional and structural components of written narratives produced during expressive writing exercises. The LIWC software counts and categorizes words by cross-referencing them with a dictionary. The program then counts and organizes them according to 80 different variables that range from parts of speech to constructs of emotion (Pennebaker et al., 2007). In general, participants in expressive writing studies tend to fare well if they demonstrate a high number of positive words, a moderate number of negative words, and an increasing number of cognitive words and personal pronouns (Campbell & Pennebaker, 2003). Word categories used in the current study include past, present, and future tense verbs, positive (e.g., love, nice, sweet) and negative emotion words (e.g., hurt, ugly, nasty), anxiety words (e.g., worried, fearful, nervous), insight words (e.g., think, know, consider), and discrepancy words (e.g., should, would, could).

*Writing Apparatus*

Participants typed directly onto a word processor to maintain efficiency and accuracy of transcription of worry narratives. They used a computer on which internet and word processing functions had been hidden so that participants were free from distractions. The writing forum utilized a program called “Darkroom” for Windows, which provides a blank screen without typical word-processing elements (http://they.misled.us/dark-room).

*Procedure*

*Phase I: Screening*

Participants completed the PSWQ as part of a larger body of questionnaires for which they received research credit in an introductory psychology course. Alternatively, psychology
students completed the PSWQ as part of a screening module used to specifically screen for ongoing research studies at the Adult Anxiety Clinic of Temple (AACT). Individuals who exceeded a cut-off score of 59 on the PSWQ were invited to participate in a study in which they were told that they would learn to employ a coping strategy for worry, write about a salient worry topic for three consecutive days, and fill out a battery of questionnaires in exchange for research credit or monetary compensation.

**Phase II: Introduction to Mindfulness or Relaxation Practice**

Eligible participants were invited to the AACT and provided with written, informed consent indicating the voluntary nature of their participation and any risks that could occur from participating in the study. After providing consent, participants were asked to fill out a series of questionnaires presented on an online research participation server that took approximately 20 to 30 minutes to complete. All participants were asked to provide demographic information and to complete the trait questionnaires described above.

Following completion of the questionnaires, participants were randomly assigned to one of four conditions (see Figure 1): EW + RP, EW + MP, CW + RP, or CW + MP. Participants were told that the study was designed to investigate the efficacy of different coping strategies for worry.

Individuals assigned to the two Mindfulness Practice groups were given a brief (5 minute) introduction to the concept of mindfulness, which focuses on paying attention in a particular way, in the present moment, non-judgmentally (Kabat-Zinn, 2003). Participants were then asked to listen to a 5-minute mindfulness CD recording in the lab. The CD recording was a breath focusing exercise in which the listener was asked to focus on physical aspects of the breath in an open, non-judgmental way. It is based on the 10-minute sitting meditation recording
that corresponds to meditation instructions presented in Kabat-Zinn (1994). The recording was transcribed and adapted by the experimenter (see Appendix B for a transcription of the Mindfulness CD).

Individuals assigned to the two Relaxation Practice groups were given a brief (5 minute) introduction to the utility of relaxation for worry. Participants were then asked to listen to a 5-minute relaxation CD recording in the lab. The relaxation recording was based on a standard 3-minute relaxation scene (Cormier & Nurius, 2003, p. 362) that was revised by the experimenter to be commensurate in length and in the inclusion of pauses with the mindfulness recording (see Appendix B for transcription of the Relaxation CD).

All participants were compensated for Phase II of the study (1 research credit or $10). Participants were then scheduled to return to the lab for three consecutive days of writing that commenced within the next several days. The number of days between coming in for Phase II and initiating Phase III for the sample ranged from 1 to 7 ($M = 2.89, SD = 2.45$).

**Phase III: Three Days of Expressive or Control Writing**

*Day 1.* Participants were first asked to listen to the same 5-minute CD (mindfulness or relaxation) that they had listened to during the previous visit to the laboratory. They were then given instructions to begin the writing task. The instructions for the expressive writing and control conditions were derived directly from the traditional written disclosure paradigm (i.e. Pennebaker, 1997; Sloan et al., 2007). The Expressive Writing instructions asked participants to write about the most distressing current topic of worry in their present life whereas the Control Writing instructions asked participants to write about everything they did since waking up that morning. (See Appendix C for the full set of Expressive Writing and Control Writing instructions).
Following completion of the 20-minute writing session, participants were asked to fill out a few brief questionnaires on the computer. These state measures (described in more detail above) were selected to assess the participants’ level of mindful awareness, positive and negative affect, and anxiety directly following the writing session. Completion of these questionnaires took 5 to 10 minutes.

Day 2. Participants were given the same instructions they had been given on Day 1 based on the CD practice condition and the writing condition to which they were randomly assigned. They then filled out the same battery of state questionnaires.

Day 3. Participants were given the same instructions as on Day 2. Following completion of the expressive or control writing, participants were asked to fill out the same battery of state questionnaires. Participants were then compensated for the three consecutive days of writing ($20 or 2 research credits) and given a debriefing handout with some information about the study, common reactions to anxiety and worry, study contact information, and referrals for therapy (See Appendix D for the Debriefing Statement). Consistent with past expressive writing studies (e.g., Sloan & Marx 2004; Sloan et al., 2007), trait-level questionnaires were not administered directly following the last writing session. Instead, participants were contacted to complete these questionnaires during a one-month follow-up period. Participants were reminded after Day 3 that the researcher would contact them in one month to fill out additional questionnaires.

Phase IV: Follow-up

All participants were contacted via phone or email 1 month following completion of the three consecutive days of writing to fill out the battery of trait questionnaires completed during the first laboratory session. They were told that completion of these questionnaires could be done
online or at the AACT. Following completion of these questionnaires, participants received compensation for their effort (1 research credit or $10).
CHAPTER 3

RESULTS

Preliminary Analyses

Prior to testing the primary hypotheses, the final sample was examined to determine whether it met assumptions of normality and homogeneity of variance for the main statistical approach, a multivariate repeated measures analysis of variance. A display of boxplots and histograms was examined for outliers, and cases that were greater than 3 SDs from the mean were removed from the relevant analyses. Next, measures of skewness and kurtosis were calculated for each variable; values generally fell within the expected limits of +/- 1 (range for all trait and state measures = .04 – 1.21). The only measure that exceeded the accepted cut-off for the assumption of normality was the pretreatment FFMQ nonreactivity subscale (kurtosis = 1.21). Several transformations were applied, but these adjustments did not succeed in making the distribution more normal. When primary analyses (discussed in detail below) were conducted using both transformed and untransformed data, there were no differences in the pattern of results. Therefore, untransformed variables were maintained. See Tables 1 and 2 for a display of means and standard deviations of all measures. Investigation of both the state and trait measures used in this study demonstrated good internal consistency. Cronbach’s $\alpha$s ranged from .70 to .95. See Tables 1 and 2 below for a full display.
Table 1.
Means, Standard Deviations, and Measures of Internal Consistency (Cronbach’s α) of Trait Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre-treatment</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α</td>
<td>M</td>
</tr>
<tr>
<td>PSWQ</td>
<td>.78</td>
<td>66.43</td>
</tr>
<tr>
<td>BDI-II</td>
<td>.90</td>
<td>18.63</td>
</tr>
<tr>
<td>GAD-Q-IV</td>
<td>.73</td>
<td>8.21</td>
</tr>
<tr>
<td>DERS Total</td>
<td>.95</td>
<td>99.25</td>
</tr>
<tr>
<td>DERS Nonacceptance</td>
<td>.93</td>
<td>16.27</td>
</tr>
<tr>
<td>DERS Goals</td>
<td>.89</td>
<td>18.33</td>
</tr>
<tr>
<td>DERS Impulsivity</td>
<td>.92</td>
<td>13.94</td>
</tr>
<tr>
<td>DERS Awareness</td>
<td>.82</td>
<td>15.17</td>
</tr>
<tr>
<td>DERS Strategies</td>
<td>.90</td>
<td>22.57</td>
</tr>
<tr>
<td>DERS Clarity</td>
<td>.88</td>
<td>12.87</td>
</tr>
<tr>
<td>AAQ</td>
<td>.88</td>
<td>40.53</td>
</tr>
<tr>
<td>EQ Decentering</td>
<td>.82</td>
<td>36.21</td>
</tr>
</tbody>
</table>

Note. Penn State Worry Questionnaire (PSWQ), Beck Depression Inventory-II (BDI-II), Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV), Difficulties in Emotion Regulation Scale (DERS), Acceptance and Action Questionnaire (AAQ), Experiences Questionnaire Decentering subscale (EQ decentering).
Table 1. (continued)

Means, Standard Deviations, and Measures of Internal Consistency (Cronbach’s $\alpha$) of Trait Measures

<table>
<thead>
<tr>
<th>FFMQ subscales</th>
<th>Pre-treatment</th>
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<th></th>
<th>Follow-Up</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$\alpha$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$\alpha$</td>
<td>$M$</td>
<td>$SD$</td>
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<tr>
<td>Nonreactivity</td>
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<td>3.69</td>
<td>.81</td>
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<tr>
<td>Observing</td>
<td>.81</td>
<td>26.28</td>
<td>5.86</td>
<td>.79</td>
<td>25.54</td>
<td>5.48</td>
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<tr>
<td>Awareness</td>
<td>.88</td>
<td>22.23</td>
<td>5.92</td>
<td>.87</td>
<td>22.36</td>
<td>5.29</td>
</tr>
<tr>
<td>Describing</td>
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<td>24.45</td>
<td>6.49</td>
<td>.92</td>
<td>24.95</td>
<td>6.46</td>
</tr>
<tr>
<td>Nonjudging</td>
<td>.93</td>
<td>21.79</td>
<td>7.26</td>
<td>.94</td>
<td>22.21</td>
<td>7.07</td>
</tr>
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</table>

*Note.* Five Factor Mindfulness Questionnaire (FFMQ).
Table 2.
Means, Standard Deviations, and Measures of Internal Consistency (Cronbach’s $\alpha$) of State Measures

<table>
<thead>
<tr>
<th></th>
<th>Writing Day 1</th>
<th></th>
<th></th>
<th>Writing Day 2</th>
<th></th>
<th></th>
<th>Writing Day 3</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>$\alpha$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$\alpha$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$\alpha$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>TMS Total</td>
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<td>41.01</td>
<td>8.91</td>
<td>.87</td>
<td>39.83</td>
<td>9.43</td>
<td>.89</td>
<td>40.72</td>
<td>10.30</td>
</tr>
<tr>
<td>TMS Decentering</td>
<td>.70</td>
<td>21.21</td>
<td>4.93</td>
<td>.90</td>
<td>20.25</td>
<td>5.54</td>
<td>.83</td>
<td>21.51</td>
<td>5.99</td>
</tr>
<tr>
<td>TMS Curiosity</td>
<td>.90</td>
<td>19.74</td>
<td>5.85</td>
<td>.90</td>
<td>19.58</td>
<td>5.72</td>
<td>.94</td>
<td>19.20</td>
<td>6.28</td>
</tr>
<tr>
<td>PANAS (PA)</td>
<td>.89</td>
<td>24.32</td>
<td>8.07</td>
<td>.92</td>
<td>23.21</td>
<td>9.02</td>
<td>.94</td>
<td>22.05</td>
<td>9.29</td>
</tr>
<tr>
<td>PANAS (NA)</td>
<td>.85</td>
<td>21.80</td>
<td>8.00</td>
<td>.87</td>
<td>19.18</td>
<td>7.47</td>
<td>.88</td>
<td>18.99</td>
<td>7.79</td>
</tr>
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<td>17.36</td>
<td>4.80</td>
<td>.87</td>
<td>17.00</td>
<td>4.88</td>
</tr>
</tbody>
</table>

Note. Toronto Mindfulness Scale (TMS), Positive and Negative Affect Scale (PANAS), State Trait Anxiety Inventory – 7 Items (STAI-7).
Zero-order correlations were calculated between each of the trait self-report measures (see Table 3). As expected from prior investigations of concurrent and discriminant validity of the various measures, the three main measures of psychopathology—PSWQ, GAD-Q-IV, and BDI-II—were highly positively correlated. In addition, the DERS and the AAQ were positively correlated with the three measures of psychopathology. The decentering subscale of the EQ was significantly negatively correlated with the PSWQ, BDI-II, GAD-Q-IV, DERS, and AAQ.

The subscales of the FFMQ were not consistently associated with one another or with the other measures. In particular, the FFMQ observe subscale was not related to any other measure, and the FFMQ describe subscale was not related to the PSWQ, BDI-II, or GAD-Q-IV. In addition, the FFMQ observe subscale was not correlated with the FFMQ describe subscale and was negatively correlated with the FFMQ aware subscale. There was also a strong positive relationship between the DERS total scale and the AAQ.

Zero-order correlations were also calculated between each of the state measures for each of the three writing days. On the first writing day (see Table 4), there was a significant positive relationship between STAI-7 and NA and between PA and TMS. On the second and third writing days (see Tables 5 and 6), there was a significant positive relationship between STAI-7 and NA and PA and TMS and a significant negative relationship between STAI-7 and PA and STAI-7 and TMS. There was no relationship between PA and NA or TMS and NA for any of the writing days.
Table 3.
Zero-order Correlations Between All Pre-treatment Trait Questionnaires

<table>
<thead>
<tr>
<th></th>
<th>PSWQ</th>
<th>BDI-II</th>
<th>GAD-Q-IV</th>
<th>DERS</th>
<th>AAQ</th>
<th>FFMQ nonreact</th>
<th>FFMQ observe</th>
<th>FFMQ aware</th>
<th>FFMQ describe</th>
<th>FFMQ nonjudging</th>
<th>EQ decenter</th>
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</thead>
<tbody>
<tr>
<td>PSWQ</td>
<td>—</td>
<td>.28**</td>
<td>.54**</td>
<td>.30**</td>
<td>.41**</td>
<td>-.32**</td>
<td>.16</td>
<td>-.29**</td>
<td>-.05</td>
<td>-.35**</td>
<td>-.31**</td>
</tr>
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<td>BDI-II</td>
<td>—</td>
<td>.54**</td>
<td>.67**</td>
<td>.70**</td>
<td>-.15</td>
<td>.20</td>
<td>-.48**</td>
<td>-.14</td>
<td>-.36**</td>
<td>-.36**</td>
<td></td>
</tr>
<tr>
<td>GAD-Q-IV</td>
<td>—</td>
<td>.38**</td>
<td>.44**</td>
<td>-.27**</td>
<td>.18</td>
<td>-.40**</td>
<td>-.09</td>
<td>-.36**</td>
<td>-.24**</td>
<td></td>
<td></td>
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<tr>
<td>DERS</td>
<td>—</td>
<td>.83**</td>
<td>-.39**</td>
<td>.01</td>
<td>-.54**</td>
<td>-.45**</td>
<td>-.54**</td>
<td>-.54**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AAQ</td>
<td>—</td>
<td></td>
<td>-.42**</td>
<td>.02</td>
<td>-.42**</td>
<td>-.27**</td>
<td>-.55**</td>
<td>-.54**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FFMQ Nonreact</td>
<td>—</td>
<td></td>
<td>.23*</td>
<td>.27**</td>
<td>.37**</td>
<td>.18</td>
<td>.65**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FFMQ observe</td>
<td>—</td>
<td></td>
<td>-.20*</td>
<td>.16</td>
<td>-.23*</td>
<td>.24*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FFMQ aware</td>
<td>—</td>
<td></td>
<td>.19</td>
<td>.37**</td>
<td></td>
<td>.34**</td>
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<tr>
<td>FFMQ describe</td>
<td>—</td>
<td></td>
<td>.16</td>
<td>.37**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FFMQ nonjudging</td>
<td>—</td>
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<td>.30**</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQ decenter</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Penn State Worry Questionnaire (PSWQ), Beck Depression Inventory-II (BDI-II), Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV), Difficulties in Emotion Regulation Scale (DERS), Acceptance and Action Questionnaire (AAQ), Five Factor Mindfulness Questionnaire (FFMQ), Experiences Questionnaire Decentering subscale (EQ decenter).

$p < .05$; $**p < .01$. 
Table 4.

Zero-order Correlations Between All State Questionnaires Following the First Writing Session

<table>
<thead>
<tr>
<th></th>
<th>STAI-7</th>
<th>PA</th>
<th>NA</th>
<th>TMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAI-7</td>
<td>—</td>
<td>-.19</td>
<td>.58**</td>
<td>-.12</td>
</tr>
<tr>
<td>PA</td>
<td>—</td>
<td>—</td>
<td>-.12</td>
<td>.42**</td>
</tr>
<tr>
<td>NA</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>TMS</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*Note.* State Trait Anxiety Inventory, Trait 7-item version (STAI-7), Positive Affect Subscale of the Positive and Negative Affect Scale (PA), Negative Affect Subscale of the Positive and Negative Affect Scale (NA), Toronto Mindfulness Questionnaire (TMS).

**p < .01.

Table 5.

Zero-order Correlations Between All State Questionnaires Following the Second Writing Session

<table>
<thead>
<tr>
<th></th>
<th>STAI-7</th>
<th>PA</th>
<th>NA</th>
<th>TMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAI-7</td>
<td>—</td>
<td>-.24*</td>
<td>.62**</td>
<td>-.33**</td>
</tr>
<tr>
<td>PA</td>
<td>—</td>
<td>—</td>
<td>-.11</td>
<td>.42**</td>
</tr>
<tr>
<td>NA</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>-.10</td>
</tr>
<tr>
<td>TMS</td>
<td>—</td>
<td>—</td>
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</tbody>
</table>

*Note.* State Trait Anxiety Inventory, Trait 7-item version (STAI-7), Positive Affect Subscale of the Positive and Negative Affect Scale (PA), Negative Affect Subscale of the Positive and Negative Affect Scale (NA), Toronto Mindfulness Questionnaire (TMS).

**p < .01; *p < .05.
Table 6.
Zero-order Correlations Between All State Questionnaires Following the Third Writing Session

<table>
<thead>
<tr>
<th></th>
<th>STAI-7</th>
<th>PA</th>
<th>NA</th>
<th>TMS</th>
</tr>
</thead>
<tbody>
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<td>STAI-7</td>
<td>—</td>
<td>-.29**</td>
<td>.64**</td>
<td>-.21*</td>
</tr>
<tr>
<td>PA</td>
<td>—</td>
<td>-.15</td>
<td>.50**</td>
<td></td>
</tr>
<tr>
<td>NA</td>
<td>—</td>
<td>—</td>
<td>-.16</td>
<td></td>
</tr>
<tr>
<td>TMS</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

*Note.* State Trait Anxiety Inventory, Trait 7-item version (STAI-7), Positive Affect Subscale of the Positive and Negative Affect Scale (PA), Negative Affect Subscale of the Positive and Negative Affect Scale (NA), Toronto Mindfulness Questionnaire (TMS).

*p < .05, **p < .01.

To test for possible pretest differences between the four experimental conditions, a one-way ANOVA was performed for age and a series of Chi-square tests were performed for categorical demographic variables (gender, ethnicity, and sexual orientation). There were no significant group differences for age \(F(3, 103) = 1.51, p = .22\)]. There were also no significant group differences for gender \(\chi^2(3, N = 107) = 2.55, p = .47\], ethnicity \(\chi^2(12, N = 106) = 6.09, p = .91\], or sexual orientation \(\chi^2(15, N = 106) = 19.45, p = .19\]. Because the sample had relatively few participants who endorsed either minority ethnic groups or sexual orientation other than exclusively heterosexual, these chi-square analyses were likely invalid. Therefore, to assess for differences among experimental conditions for ethnicity, ethnic groups were collapsed into Caucasian and minority (all other ethnic groups), and the chi-square test revealed no differences between groups: \(\chi^2(3, N = 106) = 1.51, p = .68\]. A similar approach was taken for sexual orientation; groups were collapsed to compare participants who endorsed exclusive heterosexuality compared to all others. There were no differences among experimental
conditions: \( \chi^2(3, N = 106) = 2.77, p = .43 \). Because none of the demographic variables differed across experimental groups, they were not used as covariates during the subsequent analyses.

Similarly, each dependent variable was examined for pretreatment differences across the four experimental groups. Group means did not differ significantly for any variable except the PSWQ \( F(3, 103) = 3.03, p < .05 \). Post hoc analyses revealed a mean difference of 4.6 points between the CW + RP (\( M = 64.07, SD = 5.50 \)) and the CW + MP (\( M = 68.67, SD = 4.67 \)) groups, which was significantly different at the .05 level based on Fisher’s LSD test. A close analysis of outliers and missing data was conducted on pretreatment PSWQ scores. Removing cases that were between 1 and 3 SDs above or below the mean did not change this group difference. Therefore, these cases were not excluded from further analyses. Instead, to account for this group difference, pretreatment PSWQ score was included as a covariate for all subsequent analyses, and the shape of some statistical analyses was modified accordingly.

**Primary Hypotheses**

**Differences in Scores on Follow-Up Measures**

It was expected that both experimental manipulations (i.e., mindfulness practice and expressive writing) and, in particular the EW + MP group, would result in a significant decrease on trait measures of psychopathology from pretreatment to follow-up. Therefore a main effect for both practice condition and writing condition as well as their interaction was predicted. To test **Hypotheses 1a, 1b, and 1c**, a 2 (writing condition) x 2 (practice condition) x 2 (time point: pre-treatment, follow-up) MANOVA with depression (BDI total score), worry (PSWQ total score), and GAD (GAD-Q total score) as the dependent variables was planned, with follow-up univariate ANOVAs for any significant main effects and contrasts for significant interactions.
Given the need to consider pretreatment PSWQ score as a covariate for all relevant analyses, however, a multivariate analysis of covariance (MANCOVA) was pursued instead. Although the use of ANCOVA (or MANCOVA) vs. repeated measures ANOVA (or MANOVA) in psychopathology research is a topic of considerable debate (e.g., see Miller & Chapman, 2001; Dimitrov & Rumrill, 2003; Grice & Iwasaki, 2007), it was ultimately decided that the presence of nonrandom assignment to experimental conditions for one of the primary dependent variables (worry) in the present study was an unfortunate chance occurrence. Therefore, MANCOVA with all relevant pretreatment measures as covariates was utilized to test several of the hypotheses discussed below. Significant effects from the MANCOVA were then to be followed up with univariate analyses of covariance (ANCOVAs) to test the effects on the specific dependent variables. Follow-up analysis of significant interaction effects were to be conducted with a series of planned contrasts of the EW + MP group compared to the other three groups combined.

Differences in Scores on Measures of Psychopathology at Follow-Up

To test Hypotheses 1a, 1b, and 1c, (that individuals in the EW compared to CW and those in MP compared to RP would show lower scores at follow-up on measures of worry, depression, and anxiety, and that the EW + MP condition would demonstrate the lowest scores at follow-up when controlling for pretreatment scores on these measures), a MANCOVA was conducted, with practice group and writing condition as the independent variables, post-treatment scores on the PSWQ, BDI-II, and GAD-Q-IV as the dependent variables, and pretreatment scores on these measures as covariates. To test that the assumption of equality of covariance matrices was met, Box’s Test of Equality of Covariance Matrices was utilized, and the result was nonsignificant, Box’s $M = 17.99, F(18, 20736) = 0.93, p = .54$. Levene’s test of equality of error variance was nonsignificant for each of the dependent variables in this analysis,
indicating that the assumption of homogeneity of variance was met [GAD-Q-IV: $F(3,82) = 2.25, \ p = .09$; BDI-II: $F(3,82) = .39, \ p = .76$; PSWQ: $F(3, 82) = 2.71, \ p = .05$].

Wilk’s Lambda was chosen as the test statistic for the MANCOVA because it is generally considered to be the best option (e.g., Grice & Iwasaki, 2007; Tabachnik & Fidell, 2006). Contrary to expectation, there was no significant effect of either practice condition or writing manipulation on the follow-up dependent measures, and there was also no significant interaction effect (see Table 7 and Table 17 in Appendix A for a display of group descriptive statistics).

Therefore, follow-up univariate analyses were not pursued.

Table 7.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>$\Lambda$</th>
<th>$F$</th>
<th>$df_1$</th>
<th>$df_2$</th>
<th>$p$</th>
<th>$\eta^2_p$</th>
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</thead>
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<td>Writing</td>
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<td>1.98</td>
<td>3</td>
<td>77</td>
<td>.12</td>
<td>.07</td>
</tr>
<tr>
<td>Practice</td>
<td>.95</td>
<td>1.46</td>
<td>3</td>
<td>77</td>
<td>.23</td>
<td>.05</td>
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<tr>
<td>Writing X Practice</td>
<td>.97</td>
<td>0.78</td>
<td>3</td>
<td>77</td>
<td>.51</td>
<td>.03</td>
</tr>
</tbody>
</table>

Note. Dependent measures of psychopathology included in this analysis: Penn State Worry Questionnaire (PSWQ), Beck Depression Inventory-II (BDI-II), and Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV).

Differences in Scores on Measures of Mindfulness at Follow-Up

A similar statistical approach was used to test Hypothesis 2a, 2b, and 2c: The EW group compared to the CW group and the MP group compared to the RP group would have higher scores on the FFMQ at follow-up. In addition, the EW + MP group would have the highest scores on the five facets of mindfulness on the FFMQ at follow-up when pretreatment scores on these measures and pretreatment PSWQ score were controlled. A MANCOVA was conducted, with practice condition and writing condition as the independent variables and follow-up scores
on each of the five subscales of the FFMQ (Nonreactivity, Observing, Acting with Awareness, Describing, and Nonjudging) as the dependent variables, controlling for pre-treatment scores on these subscales and pretreatment score on the PSWQ.

Box’s Test of Equality of Covariance Matrices was utilized, and the result was nonsignificant, *Box’s M* = 59.12, *F*(45, 17385) = 1.18, *p* = .20. Levene’s test of homogeneity of variance was nonsignificant for all subscales of the FFMQ except the Describing subscale [\(F(3,88) = 5.50, p < .01\)]. A square root transformation was applied to all variables, but it did not adequately address the violation of homogeneity of variance, and it did not change the pattern of results found in the MANCOVA using untransformed variables. Using both untransformed and transformed variables, there was no significant effect of practice or writing condition on the FFMQ subscales at the follow-up assessment, and there was no significant interaction effect of practice and writing (see Table 8 and Table 17 in Appendix A for a display of group descriptive statistics). Therefore, further univariate analysis of the FFMQ subscales was not conducted.

Table 8.

Multivariate Effects for the Five Facets of Mindfulness at Follow-Up

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>(\Lambda)</th>
<th><em>F</em></th>
<th>(df_1)</th>
<th>(df_2)</th>
<th><em>p</em></th>
<th>(\eta^2)</th>
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</thead>
<tbody>
<tr>
<td>Writing</td>
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<td>2.16</td>
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<td>78</td>
<td>.07</td>
<td>.12</td>
</tr>
<tr>
<td>Practice</td>
<td>.95</td>
<td>0.85</td>
<td>5</td>
<td>78</td>
<td>.52</td>
<td>.05</td>
</tr>
<tr>
<td>Writing X Practice</td>
<td>.92</td>
<td>1.31</td>
<td>5</td>
<td>78</td>
<td>.27</td>
<td>.08</td>
</tr>
</tbody>
</table>

*Note. Five Facets of Mindfulness are the Subscales of Five Facet Mindfulness Scale (FFMQ): Nonreactivity, Observing, Acting with Awareness, Describing, and Nonjudging; untransformed values are reported here.*
Differences in Scores on Measures of Emotion Regulation, Experiential Avoidance, Decentering at Follow-Up

Next, a multivariate analysis was conducted to examine Hypotheses 3a, 3b, and 3c, that the EW group compared to the CW group and the MP group compared to the RP group would demonstrate lower scores at follow-up on the AAQ and DERS and higher scores on the EQ decentering scale. In addition, it was predicted that individuals in the EW + MP condition would demonstrate the lowest scores on follow-up assessments of experiential avoidance and emotion dysregulation and highest scores of decentering, when controlling for pretreatment scores on these measures and pretreatment worry. A MANCOVA was conducted, with practice condition and writing condition as the independent variables and follow-up scores on the DERS, AAQ, and decentering subscale of the EQ as the dependent variables, controlling for pre-treatment scores on these three measures and the pretreatment score on the PSWQ. Box’s Test of Equality of Covariance Matrices was utilized, and the result was nonsignificant, $Box's M = 27.62, F(18, 20526) = 1.43, p = .11$. Levene’s test of homogeneity of variance was nonsignificant for the DERS [$F(3,80) = 0.76, p = .52$], the AAQ [$F(3,80) = 1.24, p = .30$], and the EQ decentering subscale [$F(3,80) = 0.91, p = .44$]. The expected main effects and interaction were not demonstrated (see Table 9 and Table 17 in Appendix A for a display of group descriptive statistics).
Table 9.
Multivariate Effects for Measures of Emotion Dysregulation, Experiential Avoidance, and Decentering at Follow-Up

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Λ</th>
<th>F</th>
<th>df₁</th>
<th>df₂</th>
<th>p</th>
<th>ηp²</th>
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<td>0.76</td>
<td>3</td>
<td>74</td>
<td>.52</td>
<td>.04</td>
</tr>
<tr>
<td>Practice</td>
<td>.92</td>
<td>2.05</td>
<td>3</td>
<td>74</td>
<td>.11</td>
<td>.09</td>
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<tr>
<td>Writing X Practice</td>
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<td>0.68</td>
<td>3</td>
<td>74</td>
<td>.57</td>
<td>.03</td>
</tr>
</tbody>
</table>

Note. Dependent measures included in this analysis: Difficulties in Emotion Regulation Scale (DERS), Acceptance and Action Questionnaire (AAQ), and Experiences Questionnaire Decentering Subscale (EQ Decentering).

Analysis of Measures Assessed at each Writing Session

Change Across Writing Sessions in Positive Affect, Negative Affect and Anxiety

It was hypothesized that EW compared to CW would have greater decrease in negative affect and anxiety and increase in positive affect across writing sessions (Hypothesis 4a) and that MP compared to RP would have a similar pattern (Hypothesis 4b). In addition, it was expected that the EW + MP group would show the greatest decreases in negative affect and anxiety and the greatest increases in positive affect across sessions compared to the other three groups (Hypothesis 4c). Three separate 2 (writing condition) x 2 (practice condition) x 3 (writing session) repeated measures ANCOVAs were conducted with PA, NA, and STAI-7 as the dependent variables and pretreatment PSWQ as a covariate (see Table 10 and Table 18 in Appendix A for a display of group descriptive statistics). Follow-up analysis of significant interaction effects for each of these ANOVAs were proposed, including a series of planned contrasts of the mean change of the EW + MP group to the mean change of the other three groups.
Table 10.
Repeated Measures Effects for Positive Affect, Negative Affect, and State Anxiety

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Positive Affect</th>
<th></th>
<th></th>
<th>Negative Affect</th>
<th></th>
<th></th>
<th>State Anxiety</th>
<th></th>
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<td>p</td>
<td>ηp²</td>
<td>df</td>
<td>F</td>
<td>p</td>
<td>ηp²</td>
<td>df</td>
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<tr>
<td>1</td>
<td>1</td>
<td>8.98</td>
<td>.01</td>
<td>.09</td>
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<td>17.33</td>
<td>.00</td>
<td>.15</td>
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<td>.07</td>
<td>.04</td>
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<td>1.35</td>
<td>.25</td>
<td>.01</td>
<td>1</td>
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<td>2</td>
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<td>0.33</td>
<td>.72</td>
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<td>1.07</td>
<td>.34</td>
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<td>2</td>
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<tr>
<td>Writing Condition X Practice Condition</td>
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<td>.10</td>
<td>.03</td>
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<td>0.72</td>
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<td>.01</td>
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<td>Writing Session X Practice Induction</td>
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<td>.43</td>
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<td>2.75</td>
<td>.07</td>
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<td>2</td>
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<tr>
<td>Writing Session X Writing Condition X Practice Induction</td>
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<td>.09</td>
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<td>2</td>
<td>0.48</td>
<td>.62</td>
<td>.00</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note.* Positive and Negative Affect Scale (PANAS) Positive Affect Scale (PA), PANAS Negative Affect Scale (NA), State and Trait Anxiety Inventory – 7 item version (STAI-7).
There was a significant main effect for writing condition for PA, NA, and STAI-7 (see Figure 2). Individuals in the expressive writing condition had significantly lower self-reported positive affect ($M = 20.84$, $SD = 6.50$) compared to those in the control writing condition ($M = 25.14$, $SD = 7.96$) on average across all three writing sessions. These participants also had significantly higher self-reported negative affect ($M = 22.64$, $SD = 7.35$) and anxiety ($M = 19.05$, $SD = 3.97$) compared to that of the control participants ($M = 17.44$, $SD = 5.46$ for NA; $M = 16.15$, $SD = 4.12$ for STAI-7) on average across all three writing sessions. This main effect of expressive writing was not hypothesized beyond its interaction with time (i.e. change across writing sessions), and it is limited by the interaction effect between writing condition and writing session for negative affect (discussed below).

![Figure 2](Figure 2. Significant ($p < .01$) main effect of writing condition on measures of positive affect, negative affect, and anxiety.)

There was also a significant interaction between writing condition and writing session for negative affect, such that participants in the expressive writing group reported a greater decrease in negative affect over time compared with those in the control writing group (Hypothesis 4a;...
see Figure 3). Specially, planned contrasts revealed a significant decrease ($p < .05$) in negative affect between writing day 1 ($M = 25.40$) and writing day 2 ($M = 21.19$) for expressive writing but not for control writing ($M = 18.17$ for day 1; $M = 17.19$ for day 2). Therefore, *Hypothesis 4a* was partially supported in that the predicted pattern was not observed for positive affect or anxiety. *Hypotheses 4b* and 4c were not supported.

![Figure 3. Significant interaction of writing condition and writing session for self-reported negative affect.](image)

**Evaluation of Expressive Writing as a “Mindful” Process**

To test the hypothesis set forth by Brody and Park (2004) that engaging in expressive writing is itself a process akin to practicing mindfulness, state mindfulness was examined following each writing session using the TMS. A series of three separate 2 (writing condition) x 2 (practice condition) x 3 (writing session) repeated measures ANCOVAs was conducted with measures of state mindfulness (TMS Total, TMS Curiosity subscale, and TMS Decentering subscale) as the dependent variables and pre-treatment PSWQ as a covariate (see Table 11). It
was expected that individuals in the expressive writing conditions would report higher levels of mindfulness following the writing sessions compared to those in the control writing conditions (Hypothesis 5a). Furthermore, there was a predicted interaction effect such that individuals who practiced mindfulness prior to engaging in expressive writing (EW + MP) would demonstrate higher levels of state mindful awareness following the writing sessions than individuals in the other conditions (Hypothesis 5b).
Table 11.
Repeated Measures Effects for State Mindfulness

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>TMS Total</th>
<th></th>
<th></th>
<th>TMS Curiosity</th>
<th></th>
<th></th>
<th>TMS Decentering</th>
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</thead>
<tbody>
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<td></td>
<td>df</td>
<td>F</td>
<td>p</td>
<td>df</td>
<td>F</td>
<td>p</td>
<td>df</td>
<td>F</td>
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<tr>
<td>Writing Condition</td>
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<td>.45</td>
<td>1, 98</td>
<td>0.06</td>
<td>.82</td>
<td>1, 98</td>
<td>2.61</td>
</tr>
<tr>
<td>Practice Condition</td>
<td>1, 98</td>
<td>3.82</td>
<td>.05</td>
<td>1, 98</td>
<td>1.89</td>
<td>.17</td>
<td>1, 98</td>
<td>3.94</td>
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<td>Writing Session</td>
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<td>0.81</td>
<td>.45</td>
<td>2, 97</td>
<td>0.49</td>
<td>.61</td>
<td>2, 97</td>
<td>0.41</td>
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<td>Writing Condition X Practice</td>
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<td>.21</td>
<td>1, 98</td>
<td>2.18</td>
<td>.14</td>
<td>1, 98</td>
<td>0.42</td>
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<tr>
<td>Condition</td>
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<td></td>
</tr>
<tr>
<td>Writing Session X Writing Condition</td>
<td>2, 97</td>
<td>0.61</td>
<td>.54</td>
<td>2, 97</td>
<td>1.32</td>
<td>.27</td>
<td>2, 97</td>
<td>0.23</td>
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<tr>
<td>Writing Session X Practice</td>
<td>2, 97</td>
<td>0.37</td>
<td>.69</td>
<td>2, 97</td>
<td>0.20</td>
<td>.82</td>
<td>2, 97</td>
<td>1.23</td>
</tr>
<tr>
<td>Condition</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing Session X Writing Condition</td>
<td>2, 97</td>
<td>0.63</td>
<td>.54</td>
<td>2, 97</td>
<td>1.46</td>
<td>.24</td>
<td>2, 97</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Note. Toronto Mindfulness Scale (TMS) Total Score; TMS Curiosity Subscale (TMS Curiosity); TMS Decentering Subscale (TMS Decentering).
There was a nearly significant main effect \( (p = .05) \) for practice in both the TMS total scale and for the TMS decentering subscale, such that individuals in the mindfulness practice condition reported higher levels of state mindfulness \( (M = 42.26, SD = 8.36 \text{ for TMS total}; \ M = 21.94, SD = 5.11 \text{ for TMS decentering}) \) compared to those in the relaxation condition \( (M = 38.75, SD = 9.00 \text{ for TMS total}; \ M = 20.06, SD = 4.59 \text{ for TMS decentering}) \) following the writing sessions (see Figure 4). Hypothesis 5b was not supported.

![Figure 4. Significant main effect of practice condition on measures of state mindfulness averaged across the three writing sessions.](image)

In addition, to more specifically test the hypothesis that expressive writing is a “mindful” process without the confounding influence of participants having engaged in a brief practice of mindfulness, a series of three separate 2 (writing condition) x 3 (writing session) repeated measures ANCOVAs was conducted with measures of state mindfulness (TMS Total, TMS Curiosity subscale, and TMS Decentering subscale) as the dependent variables and pre-treatment PSWQ as a covariate, in the subset of participants who engaged in relaxation practice (see Table 12). It was expected that individuals in the EW + RP condition would report higher levels of
Table 12.
Repeated Measures Effects for State Mindfulness in the Relaxation Practice
Conditions

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TMS Total Score</strong></td>
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<td></td>
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</tr>
<tr>
<td>Writing Condition</td>
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<td>.54</td>
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<tr>
<td>Writing Session</td>
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<td>.87</td>
</tr>
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<td>Writing Session X Writing Condition</td>
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<td>.58</td>
</tr>
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<td><strong>TMS Curiosity Subscale</strong></td>
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<td>Writing Condition</td>
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<td>Writing Session</td>
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<td>.59</td>
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<td>Writing Session X Writing Condition</td>
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<td>.21</td>
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<tr>
<td><strong>TMS Decentering Subscale</strong></td>
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<td>Writing Session</td>
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</tr>
<tr>
<td>Writing Session X Writing Condition</td>
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<td>0.05</td>
<td>.95</td>
</tr>
</tbody>
</table>

*Note.* Toronto Mindfulness Scale (TMS) Total Score; TMS Curiosity Subscale (TMS Curiosity); TMS Decentering Subscale (TMS Decentering).

mindfulness following the writing sessions compared to those in the CW + RP condition (*Hypothesis 5c*). This hypothesis was not supported. Considering results from *Hypothesis 5a* and 5c together, there is some evidence to suggest that expressive writing is itself a mindful process; however, it is not clear whether this effect is better explained by having engaged in a practice of mindfulness prior to doing the expressive writing.
Impact of GAD Status

It was expected that participants who met diagnostic criteria for GAD according to their self-report on the GAD-Q-IV would have more deficits in emotion regulation compared to those high-worrying participants who did not meet criteria for GAD (Hypothesis 6). Newman et al. (2002) suggest a cut-off score of 5.7 on the GAD-Q-IV as the score that optimizes sensitivity and specificity in predicting GAD clinical status previously determined from diagnostic interview. In the current sample, only a small subset of participants ($n = 9$) failed to meet criteria for GAD according to their pre-treatment responses on the GAD-Q-IV. Therefore, Hypothesis 6 in its original form was not explored. An alternative approach to this hypothesis was undertaken using a median split (8.67) on GAD-Q-IV severity. A series of independent samples $t$-tests was conducted to examine the difference in mean scores of the DERS total scale and each of the DERS subscales (Nonacceptance, Goals, Impulse, Awareness, Strategies, and Clarity) between participants above and below the median on the GAD-Q-IV. A Bonferroni correction of .007 ($.05/7 = .007$) was applied to compensate for family-wise error.

As predicted, participants above the median on self-reported symptoms of GAD compared to those below the median were significantly more likely to endorse overall difficulties in emotion regulation (DERS total score; $t(100) = 2.90, p < .007$). In addition, these participants were more likely to endorse nonacceptance of emotions [$t(102) = 3.21, p < .007$] and difficulty engaging in goal-directed behavior [$t(102) = 2.78, p < .007$]. The other DERS subscales did not reveal a significant difference between participants who scored higher on the GAD-Q-IV compared to those who scored lower.

It was also expected that high worry regardless of GAD status would be associated with two specific aspects of mindfulness: acting with awareness and nonjudging of inner experience
(Hypothesis 7). The same problem of the sample having an insufficient number of participants who did not meet criteria for GAD made it impossible to test Hypothesis 7 in its original form. Instead, a median split (8.67) on the GAD-Q-IV was utilized as an alternative means to evaluate this hypothesis. A negative relationship between PSWQ scores and scores on the awareness and nonjudging subscales of the FFMQ was predicted, and this hypothesis was supported. For the overall sample, there was a significant negative relationship between pretreatment PSWQ and FFMQ nonjudging ($r = -.35, p < .01$) and between PSWQ and FFMQ aware ($r = -.29, p = .01$), and there was no difference in the strength of this relationship between individuals above and below the median on the GAD-Q-IV (Fisher’s $z = -.032, p = .37$).

**Analysis of Writing Narrative Content**

Several predictions were made regarding the word content of the writing samples collected during the three consecutive days of writing. Hypothesis 8, that individuals in the EW + MP condition compared to those in the EW + RP condition would demonstrate a decrease in the use of past and future tense verbs and an increase in the use of present tense verbs, was examined with a series of three 2 (practice condition) x 3 (writing session) repeated measures ANCOVAs with word count for past tense verbs, present tense verbs, and future tense verbs as the dependent variables and pretreatment PSWQ as a covariate. Contrary to expectation, there were no differences in frequency of past, present, or future verb tenses found in the expressive writing narratives (See Table 13).
Table 13.
Repeated Measures Effects for Past, Present, and Future-Tense Verbs in the Expressive Writing Conditions

<table>
<thead>
<tr>
<th>Source of Variation</th>
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<th>F</th>
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</tr>
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<td>.76</td>
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<td>Writing Session</td>
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<td>.61</td>
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<td>.60</td>
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<td>Present Tense Verbs</td>
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<td>.74</td>
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<td>3.08</td>
<td>.08</td>
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<td>Future Tense Verbs</td>
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<td>Writing Session X Practice Condition</td>
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<td>0.93</td>
<td>.40</td>
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</table>

Note. Past, present, and future verb counts from the expressive writing narratives, derived using the Linguistic Inquiry and Word Count (LIWC) software.

_Hypothesis 9_ predicted that individuals in the EW + MP condition compared to those in the EW + RP condition would use fewer insight words (e.g., think, know, consider) and discrepancy words (e.g., should, could) over time. It was examined with a series of two 2 (practice condition) x 3 (writing session) repeated measures ANCOVAs with word count for insight words and discrepancy words as the dependent variables and pretreatment PSWQ as a covariate (see Table 14). This hypothesis was not supported. Although not hypothesized, it is
noted that there was a significant change over time in the number of discrepancy words generated, regardless of practice condition. However, post hoc t-test comparisons (using a Bonferroni correction of .05/3 = .02) of differences in discrepancy words across writing sessions failed to reveal any significant differences.

Table 14.

Repeated Measures Effects for Insight and Discrepancy Words in the Expressive Writing Conditions

<table>
<thead>
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<th>Source of Variation</th>
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<td>.30</td>
</tr>
<tr>
<td>Writing Session</td>
<td>2, 38</td>
<td>0.11</td>
<td>.75</td>
</tr>
<tr>
<td>Writing Session X Practice Condition</td>
<td>2, 38</td>
<td>0.71</td>
<td>.40</td>
</tr>
<tr>
<td>Discrepancy Words</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice Condition</td>
<td>1, 39</td>
<td>0.37</td>
<td>.54</td>
</tr>
<tr>
<td>Writing Session</td>
<td>2, 38</td>
<td>3.46</td>
<td>.04</td>
</tr>
<tr>
<td>Writing Session X Practice Condition</td>
<td>2, 38</td>
<td>1.70</td>
<td>.20</td>
</tr>
</tbody>
</table>

Note. Insight and discrepancy word counts from the expressive writing narratives, derived using the Linguistic Inquiry and Word Count (LIWC) software.

To test Hypothesis 10, a series of three 2 (writing condition) x 2 (practice condition) x 3 (writing session) repeated measures ANCOVAs were conducted with word count for positive emotion, negative emotion, and anxiety words as the dependent variables. The EW group compared to the CW group was expected to demonstrate decreased use of negative emotion words and anxiety words and increased use of positive emotion words across writing sessions (Hypothesis 10a). The MP group compared to the RP group was expected to demonstrate the same pattern (Hypothesis 10b). In addition, it was anticipated that the EW + MP group would
generate decreased negative emotion and anxiety words and increased positive emotion words across sessions in comparison to the other groups (Hypothesis 10c). See Table 15 for a full display of this analysis.

There was a significant main effect for writing condition for positive emotion words, negative emotion words, and anxiety words. Individuals in the expressive writing condition used positive emotion words ($M = 2.48, SD = 0.88$), negative emotion words ($M = 3.40, SD = 1.22$), and anxiety words ($M = 1.45, SD = 0.87$) significantly more frequently than did individuals in the control writing conditions ($M = 1.51, SD = 0.83$ for positive emotion words; $M = 0.91, SD = 0.82$ for negative emotion words; $M = 0.34, SD = 0.41$ for anxiety words) on average across all three writing sessions (see Figure 5). Although this effect was not hypothesized outside of its interaction with time (i.e. change across writing sessions), it follows logically that individuals instructed to write about a worry topic would use more emotion words than those asked to write about the events of their day. However, this effect is limited by the significant interaction between writing condition and practice condition for the number of positive words generated in the writing narratives (discussed below).
Table 15.
Repeated Measures Effects for Positive Emotion, Negative Emotion, and Anxiety Words Generated During the Writing Sessions

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Positive Emotion Words</th>
<th>Negative Emotion Words</th>
<th>Anxiety Words</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>df</td>
<td>F</td>
<td>p</td>
</tr>
<tr>
<td>Writing Condition</td>
<td>1, 84</td>
<td>27.87</td>
<td>.01</td>
</tr>
<tr>
<td>Practice Condition</td>
<td>1, 84</td>
<td>0.06</td>
<td>.82</td>
</tr>
<tr>
<td>Writing Session</td>
<td>2, 83</td>
<td>0.81</td>
<td>.45</td>
</tr>
<tr>
<td>Writing Condition X Practice Condition</td>
<td>1, 84</td>
<td>4.78</td>
<td>.03</td>
</tr>
<tr>
<td>Writing Session X Writing Condition</td>
<td>2, 83</td>
<td>0.61</td>
<td>.54</td>
</tr>
<tr>
<td>Writing Session X Practice Condition</td>
<td>2, 83</td>
<td>0.37</td>
<td>.69</td>
</tr>
<tr>
<td>Writing Session X Writing Condition X Practice Conduction</td>
<td>2, 83</td>
<td>0.63</td>
<td>.54</td>
</tr>
</tbody>
</table>

*Note: Positive emotion, negative emotion, and anxiety word counts from the expressive and control writing narratives, derived using the Linguistic Inquiry and Word Count (LIWC) software.*
There was also a significant interaction between writing condition and practice condition for the number of positive words generated in the writing narratives, averaged across writing sessions. Although this effect was not hypothesized, \textit{post hoc} analysis revealed that for subjects in the mindfulness practice condition there was no difference in the number of positive emotion words generated between EW ($M = 2.29, SD = 0.82$) and CW ($M = 1.68, SD = 0.87$) groups [$t(41) = -1.13, p = .26$], but among subjects in the relaxation practice conditions, there were significantly more positive words generated in the EW ($M = 2.66, SD = 0.91$) condition compared to the CW ($M = 1.37, SD = 0.78$) condition [$t(44) = -5.18, p < .01$; see Figure 6].

Figure 5. Significant main effect of writing condition on measures of positive emotion words, negative emotion words, and anxiety words from the writing narratives averaged across the three writing sessions ($ps < .05$).
It was anticipated that higher pretreatment scores on the measure of the mindfulness trait "nonjudging of inner experience" would be associated with a lower number of discrepancy, insight, and causation words, as the concept of judgment in writing was operationally defined by these three categories of words (Hypothesis 11). Correlations between the Nonjudging subscale of the FFMQ and the number of insight, discrepancy, and causation words for each of the three days of writing were calculated. Contrary to hypothesis, none of these correlations was significant for any of the writing sessions (rs ranged from -.02 to -.11).

Finally, it was expected that frequency of word categories generated during the writing sessions would correspond to participants' self-reported emotional state. Specifically, it was expected that for each writing day, positive emotion words would be related to PA score, negative emotion words would be related to NA score, and anxiety words would be rated to STAI-7 score (Hypothesis 12). A series of bivariate correlations was calculated to test each of these relationships (see Table 16). A Bonferroni correction of (.05/9 = .006) was used to adjust
for family-wise error. The general pattern of results for positive affect and anxiety suggested no significant relationship between self-reported affect and frequency of positive emotion or anxiety words. Negative affect, however, was significantly related to the frequency of negative emotion words in the writing narratives on writing days 1 and 2 but not day 3.
Table 16.

Bivariate Correlations (Pearson’s r) Between Self-reported Affect and Word Content in the Writing Narratives

<table>
<thead>
<tr>
<th></th>
<th>Writing Day 1</th>
<th>Writing Day 2</th>
<th>Writing Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PA</td>
<td>NA</td>
<td>STAI</td>
</tr>
<tr>
<td>Positive Emotion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Words</td>
<td>.20</td>
<td>.12</td>
<td>.06</td>
</tr>
<tr>
<td>Negative Emotion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Words</td>
<td>.37*</td>
<td>.35*</td>
<td>.19</td>
</tr>
<tr>
<td>Anxiety Words</td>
<td>.13</td>
<td>.23</td>
<td>.26</td>
</tr>
</tbody>
</table>

*Note. Positive and Negative Affect Scale (PANAS) Positive Affect Subscale (PA); PANAS Negative Affect Subscale (NA); State-Trait Anxiety Inventory 7-item Version (STAI-7). *p < .01.
CHAPTER 4:
DISCUSSION

Overview of the Present Study

The study of mindfulness—paying attention nonjudgmentally to one’s moment-by-moment internal and external experience—has achieved a substantial presence in Western psychology over the past several decades. Substantive research has documented the efficacy of mindfulness-based therapy for a variety of psychological problems, including the anxiety disorders. The conceptual basis for targeting nonjudgmental awareness of one’s thoughts, feelings, and behavior is particularly salient in the treatment and study of GAD, a disorder characterized by excessive and uncontrollable worry about future events. The act of worry by definition allows an individual to be distracted from the present moment by contemplating potentially negative future events.

Relatively little research has investigated the process of mindfulness in controlled settings. The current study examined the effect of two experimental manipulations—the teaching and practice of a brief mindfulness exercise and the engagement in expressive writing about a worry topic—in a sample of undergraduate students with pathological worry. This study utilized measures of state and trait psychopathology and mindfulness as well as trait measures of variables (i.e., experiential avoidance, emotion dysregulation, and decentering) hypothesized to be related to mindfulness and the worry process. Contrary to expectation, mindfulness practice, expressive writing, and their interaction failed to demonstrate a significant effect on the majority of measures tested.

Primary Findings

The overall predicted effect of the combined experimental conditions in this study was not found. That is, individuals who were introduced to a brief mindful breathing
exercise and subsequently instructed to practice this exercise and then engage in expressive writing about a worry topic on three consecutive occasions were expected to demonstrate the greatest change in several measures of psychopathology and mindfulness compared to individuals assigned to the other three combinations of experimental conditions.

The first set of hypotheses was designed to examine differences in trait measures of psychopathology, mindfulness, and related variables after engaging in expressive writing. Similar to the results of Goldman et al. (2007), it was expected that high worriers who engaged in expressive writing compared to those in the control writing condition would demonstrate changes over time in measures of worry, depression, and GAD. This effect was not replicated in the current sample. In addition, it was anticipated that the group of individuals who practiced mindfulness before engaging in expressive writing would demonstrate the lowest scores on measures of worry, depression, and GAD following consecutive days of writing compared to participants in the other three conditions. This interaction was also not demonstrated, suggesting that the brief practice of mindfulness prior to engaging in consecutive days of expressive writing did not impact individuals’ self-reported symptoms of depression, worry, or GAD. Similarly, neither the brief practice of mindfulness nor expressive writing about a worry topic had an effect on individuals’ self-reported trait mindfulness, emotion dysregulation, experiential avoidance, or decentering. No prior investigations of expressive writing have examined these variables.

The next set of analyses aimed to examine changes in state measures of positive affect, negative affect, and anxiety directly following expressive writing sessions. A few
studies (e.g., Arch & Craske, 2006; Huffziger & Kuehner, 2009) have examined differences in affect directly following brief mindfulness practice with mixed results. Similar to Huffziger and Kuehner (2009), it was anticipated that individuals who practiced a mindfulness exercise prior to engaging in expressive writing would show significantly lower negative affect, but this expectation was not supported in the current study. Furthermore, Arch and Craske (2006) found that individuals who practiced a mindful breathing exercise prior to viewing a negative film clip demonstrated less negative affect than individuals in either a worry or a control condition. This finding was not replicated in the current study, as individuals who practiced mindfulness before engaging in expressive writing did not have less negative affect than those who practiced relaxation before engaging in expressive writing.

The current study also failed to find a predicted effect on positive affect, in that individuals who practiced mindfulness did not have higher positive affect following expressive writing than those who practiced relaxation. This finding conflicts with that of Arch and Craske (2006), who found that individuals who practiced mindfulness had higher positive affect after viewing positive and neutral film clips. This finding that a brief mindfulness intervention has an effect on positive affect related to emotional stimuli is also inconsistent with a very recent study that examined the relationship between mindfulness and emotion regulation in a sample of individuals who have elevated difficulty with emotion regulation (and, in turn, are similar to individuals diagnosed with GAD; Erisman & Roemer, 2010). Individuals were assigned to either mindfulness (a 10-minute recording including education about mindful breathing and mindfulness of emotions followed by a brief practice of each) or control (a neutral educational recording)
conditions and were then instructed to watch negative, positive, and mixed-valenced film clips. The mindfulness intervention did not have an effect on self-reported emotion dysregulation or negative affect after watching the film clip, but the authors did report higher positive affect in response to the positive film clip and less negative affect in response to the mixed-valenced film clip.

The current study partially replicated previous findings of Goldman et al. (2007) that high-worrying individuals who engaged in expressive writing showed significant decreases on measures of depression, anxiety, and worry before and after engaging in the writing task. Although the current study did not demonstrate significant changes in trait measures of psychopathology over time, there was a significant decrease in negative affect from the first day of writing to the second day for those in the expressive writing group but not for those in the control writing group. This finding could suggest a habituation to the writing task consistent with the hypothesized mechanism of action in exposure therapy (i.e. Foa & Kozak, 1986; Sloan & Marx, 2004).

One of the primary purposes of the current study was to examine more broadly the idea of mindfulness as a potential underlying process of expressive writing. Brody and Park (2004) suggested that expressive writing is conceptually similar to mindful awareness because it indirectly requires one’s purposeful attention to emotionally evocative and idiographic stimuli. Participants’ ratings of how mindful they felt directly following each expressive writing session were used to evaluate this hypothesis. There were no differences across writing sessions between expressive and control writing on measures of total state mindfulness, decentering, or curiosity. That is, there was no
increase with successive sessions of expressive writing on individuals’ self-reported mindful awareness.

However, there was a nearly significant main effect of practice ($p = .05$) for both total state mindfulness and the decentering subscale (but not the curiosity subscale). Several authors (i.e. Fresco et al., 2007; Shapiro et al., 2006) have proposed the importance of decentering as a mechanism underlying the efficacy of mindfulness practice. This finding suggests that individuals who practiced mindfulness prior to writing reported higher levels of decentering compared to those who practiced relaxation prior to writing, regardless of whether they engaged in expressive or control writing. There was no effect for writing in the full sample or when examining only those who engaged in relaxation practice, to eliminate the possible confounding influence of having practiced a mindful breathing exercise. Therefore, this study does not support of Brody and Park’s (2004) hypothesis that expressive writing is itself a mindful process. It does, however, suggest that individuals who engaged in mindfulness practice reported higher levels of mindful awareness compared to those who practiced relaxation.

Consistent with prior research related to the relationship between GAD and emotional expression (Ruscio & Borkovec 2004), there was a significant relationship between levels of GAD symptoms and overall difficulties with emotion regulation. More specifically, individuals with higher levels of GAD symptoms had difficulty with nonacceptance of emotions and engaging in goal-directed behavior. In addition, as predicted, the full sample—regardless of their severity of GAD symptoms—showed a significant relationship between worry and both acting with awareness and nonjudging of
inner experience. These specific facets of mindfulness were hypothesized to be related to the worry process, whether or not worry is intensified by more severe symptoms of GAD.

Several predictions were made regarding the content of the writing samples, which were largely not supported. It was hypothesized that the writing narratives of those participants who practiced mindfulness prior to writing would reflect aspects of mindfulness, including relatively fewer past- and future-tense verbs and words implying use of judgment. There was no effect of having practiced mindfulness on the use of past/future-tense verbs or words implying judgment. This negative finding is consistent with the findings of Low et al. (2008).

In addition, based on past findings that a brief practice of mindfulness is related to increased positive affect (e.g., Arch & Craske, 2006; Erisman & Roemer 2010), it was expected that individuals who practiced mindfulness would use more positive emotion words than those who practiced relaxation. The same result was not demonstrated in this study. In fact, there was a puzzling interaction between writing condition and practice condition for the number of positive emotion words generated on average across writing sessions. That is, individuals who practiced mindfulness showed no difference in positive emotion words regardless of whether they were assigned to the expressive writing condition or the control writing condition. However, for individuals who practiced relaxation, there were significantly more positive words generated in the expressive writing condition compared to the control writing condition. Although this result was not anticipated as it conflicts with past research, it could be explained by the nature of the active control group used in this study. Perhaps individuals in the relaxation condition
generated more positive words when they engaged in expressive writing because they were able to identify with the idea of evoking feelings of relaxation.

Discussion of Primary Findings

Several considerations could explain the lack of expected findings in this study. First of all, random assignment to the four experimental conditions was inadvertently flawed, as the mean score for baseline worry was significantly higher in participants assigned to practice mindfulness and control writing compared to those assigned to practice relaxation and control writing. It was therefore necessary to control for baseline worry in all subsequent analyses, which in effect could have diluted a potentially significant change in measures of psychopathology between baseline and follow-up, particularly when assessing for main effects of the mindfulness manipulation.

In addition, the choice of experimental control could also explain why this study did not replicate findings of similar past studies. In particular, Erisman and Roemer (2010) utilized a neutral educational information session as a control and suggested that future research should consider examining the relationship between mindfulness and emotion regulation using more active control groups. In addition, Arch and Craske (2006) had both a mindfulness condition and a worry condition but found that individuals in the mindfulness condition showed less negative affect in response to viewing negative stimuli compared to those in the worry condition but not those in the control condition, suggesting that the difference in negative affect could be better explained by the negative aspects of the worry manipulation rather than the positive aspects of the mindfulness manipulation. In the current study, brief practice of mindfulness fared less well in the ability to influence the generation of positive emotion words compared to brief practice.
of relaxation. The choice of control group in the current study suggests that at least in small doses in this controlled setting, participants with high worry may have difficulty differentiating brief mindfulness practice from brief relaxation practice and may have difficulty experiencing the benefits of mindfulness (i.e., increased positive affect) that have been documented in previous literature to be associated with longer mindfulness practice or that were determined in comparison to a non-active control group.

One prior study of expressive writing (Low et al., 2008) examined the effects of manipulating writing instructions to emphasize either acceptance or judgment of emotions. In the current study, there was no specific effort made to manipulate the instructions or to emphasize use of mindfulness in the writing itself. Doing so may have encouraged participants more directly to be “mindful” while engaging in expressive writing and, thus, resulted in a more prominent effect of several different aspects of mindfulness, including less judgmental word content in the writing narratives and higher self-reported decentering and curiosity following the writing.

Similarly, there were no instructions for participants in the expressive writing condition to write about the same worry topic across the three writing sessions. This was a purposeful choice intended to allow individuals to select the worry topic most salient to them at that time. However, the lack of consistency in worry topics could have affected the assessment of change in word content over time, given that there may not have been sufficient opportunity for processing of the worry topic across writing sessions. In addition, similar to the conclusion that Erisman and Roemer (2010) made in their study, that the negative film clip was too distressing to be affected by such a brief mindfulness intervention, expressive writing about a worry topic may have been too emotionally
evocative for this population of high worriers. Participants may have come into the intervention balancing academic and life stress significant enough to preclude the brief introduction to mindfulness from affecting their report of negative affect or their ability to be less judgmental of their emotions.

**Clinical Implications**

The current study did not replicate findings of Goldman et al. (2007) that expressive writing demonstrates decreases in measures of depression and worry for individuals with pathological worry. This lack of consistent results calls to question whether expressive writing is a suitable intervention for clinical samples of individuals with high worry. Although this sample was not treatment-seeking, it was similar to a clinical sample of GAD in that the majority of participants reported symptoms of GAD that would exceed the diagnostic threshold of the disorder. Other researchers have written about the lack of support for expressive writing as a viable clinical intervention, particularly when effect sizes are representative of comparisons with non-active controls. For example, a recent investigation of expressive writing in individuals who met diagnostic criteria for PTSD found no difference between expressive writing and control writing one month following the intervention (Sloan, Marx, & Greenberg, 2011). This recent study replicates previous findings in two studies that failed to demonstrate the efficacy of expressive writing for individuals with PTSD (Gidron, Peri, Connolly, & Shalev, 1996; Smyth, Hockemeyer, & Tulloch, 2008). No known published studies of individuals with clinically significant GAD have been conducted. However, it is likely that expressive writing on its own is not sufficient to effect changes in measures of psychopathology in individuals with clinically significant GAD.
A similar criticism (e.g., Toneatto & Nguyen, 2007; Hofmann, Sawyer, Witt, & Oh, 2010) has been made about the effect sizes for trials of mindfulness interventions. Although the efficacy of MBSR and other mindfulness-based treatments is well-established, the effect of these treatments on specific symptoms of depression and anxiety when assessed in comparison to active control groups is less convincing, as most studies conducted thus far have not utilized active control groups. Similarly, previous research about the process of mindfulness in the laboratory has largely been conducted without the use of an active control group. More research should be done in both randomized controlled trials for specific mindfulness interventions and in laboratory analog studies that utilize active control groups.

Limitations and Future Directions

Several limitations could have impacted the results in the present study. Although there were no differences in gender or other demographic characteristics in this study, no effort was made to collect an equal number of men and women or various ethnic groups to assess these characteristics as possible moderating variables. In addition, no thorough assessment of prior experience with mindfulness, meditation, or yoga was made prior to randomization. This would be useful to assess in future studies. The current study examined a self-selected sample of high-worriers interested in receiving course credit or monetary compensation in exchange for their participation.

The present study failed to demonstrate many of the expected effects for both expressive writing and mindfulness practice. This study is one of the first to examine a brief mindfulness intervention in a specific quasi-clinical sample of high-worrying individuals. As one of the few preliminary examinations of this kind, this study highlights
the need to understand and anticipate problems that emerge from the assimilation of two areas of study. The meeting of Eastern contemplative practice with Western psychology has created the unique opportunity for a new discipline: the rigorous study of meditation, a process practiced for thousands of years. This emerging discipline has therefore not surprisingly demonstrated some growing pains, and leaders in the field have outlined important factors to consider for future research.

Most leaders in the field embrace the integration of meditation with modern psychological practice. However, some caution that valuable information is lost if psychologists fail to properly understand the depths and nuances of meditation when they attempt to operationalize its processes. Walsh and Shapiro (2006), for instance, describe the importance of assessing variables central to the thinking of contemplative researchers (e.g., deep understanding, enlightenment, and compassion) that emerge from consistent meditation practice over time, rather than focusing only on psychological variables that are typically studied. On the other hand, Davidson (2010) expresses his belief that any study of mindfulness—brief or otherwise—moves us towards a greater understanding of the ways in which being more aware and less judgmental of one’s internal and external experience can be helpful for one’s overall health and well-being. In any case, there is much evidence (e.g., Baer, 2006) to suggest that mindfulness is a skill that improves over time, and thus, the possibility of finding effects in the present study could increase if participants had been given more of an opportunity to practice mindfulness. It is possible, therefore, that the current study did not provide sufficient time for mindfulness skills to be developed and practiced in order to detect a measurable change.
Future studies should examine the relationship between mindfulness and expressive writing using different variations of writing instructions. In addition, they should consider different methods for inducing worry, including more directive writing, or guided imagery about a worry topic, to examine whether mindfulness specifically targets one’s tendency to be judgmental about his or her emotional experience during a worry episode. In addition, it would be interesting to have participants practice mindfulness between writing sessions to see if it improves their ability to access aspects of mindfulness during the writing process. Finally, it would be helpful to utilize a treatment-seeking sample to see whether there are different effects of mindfulness and expressive writing in individuals who are motivated to reduce the distress and interference associated with worry.
REFERENCES


doi:10.1177/1073191107313003


doi:10.1207/s15327752jpa6703_13


doi:10.1207/s15327752jpa6703_13


considerations and preliminary results. *General Hospital Psychiatry, 4,* 33-47. doi:10.1016/0163-8343(82)90026-3


the status of empirically supported therapies. *Journal of Consulting and Clinical Psychology, 69*, 875-899.

APPENDIX A: Supplemental Tables

Table 17.
Group Means and Standard Deviations for Dependent Measures at Follow-up

<table>
<thead>
<tr>
<th>Dependent Measure</th>
<th>EW + MP</th>
<th>EW + RP</th>
<th>CW + MP</th>
<th>CW + RP</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAD-Q-IV</td>
<td>9.15 (1.88)</td>
<td>9.03 (2.37)</td>
<td>7.95 (3.15)</td>
<td>7.66 (2.38)</td>
</tr>
<tr>
<td>BDI-II</td>
<td>20.11 (9.96)</td>
<td>19.90 (11.54)</td>
<td>13.33 (13.84)</td>
<td>15.19 (8.65)</td>
</tr>
<tr>
<td>PSWQ</td>
<td>65.06 (6.92)</td>
<td>63.81 (9.24)</td>
<td>60.29 (11.15)</td>
<td>61.38 (9.38)</td>
</tr>
<tr>
<td>DERS</td>
<td>102.15 (19.32)</td>
<td>101.48 (24.61)</td>
<td>89.90 (33.54)</td>
<td>99.92 (22.78)</td>
</tr>
<tr>
<td>EQ Decentering</td>
<td>37.15 (5.43)</td>
<td>35.52 (8.46)</td>
<td>41.05 (9.27)</td>
<td>37.08 (6.59)</td>
</tr>
<tr>
<td>AAQ</td>
<td>43.20 (6.83)</td>
<td>39.04 (9.05)</td>
<td>35.45 (13.52)</td>
<td>39.28 (10.27)</td>
</tr>
<tr>
<td>FFMQ nonreact</td>
<td>18.15 (3.21)</td>
<td>18.29 (4.91)</td>
<td>19.90 (4.58)</td>
<td>18.90 (3.87)</td>
</tr>
<tr>
<td>FFMQ observe</td>
<td>26.70 (5.98)</td>
<td>24.58 (5.58)</td>
<td>27.00 (5.70)</td>
<td>24.63 (4.53)</td>
</tr>
<tr>
<td>FFMQ aware</td>
<td>21.95 (3.56)</td>
<td>22.83 (4.55)</td>
<td>23.48 (5.87)</td>
<td>21.19 (5.68)</td>
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<tr>
<td>FFMQ describe</td>
<td>23.60 (5.84)</td>
<td>23.29 (5.59)</td>
<td>28.29 (6.39)</td>
<td>26.19 (6.86)</td>
</tr>
<tr>
<td>FFMQ nonjudging</td>
<td>18.80 (5.41)</td>
<td>22.42 (7.05)</td>
<td>24.05 (7.67)</td>
<td>22.96 (7.81)</td>
</tr>
</tbody>
</table>

Note. Penn State Worry Questionnaire (PSWQ), Beck Depression Inventory-II (BDI-II), Generalized Anxiety Disorder Questionnaire for DSM-IV (GAD-Q-IV), Difficulties in Emotion Regulation Scale (DERS), Acceptance and Action Questionnaire (AAQ), Five Factor Mindfulness Questionnaire (FFMQ), Experiences Questionnaire Decentering subscale (EQ decenter).
Table 18.
Group Means and Standard Deviations for Positive Affect, Negative Affect, and Anxiety Following Each Writing Session

<table>
<thead>
<tr>
<th>Dependent Measure</th>
<th>Randomization Condition</th>
<th>$M$ ($SD$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EW + MP</td>
<td>EW + RP</td>
</tr>
<tr>
<td>PA Day 1</td>
<td>23.67 (8.29)</td>
<td>27.67 (9.41)</td>
</tr>
<tr>
<td>PA Day 2</td>
<td>19.58 (6.89)</td>
<td>22.22 (9.22)</td>
</tr>
<tr>
<td>PA Day 3</td>
<td>19.00 (7.06)</td>
<td>18.48 (6.01)</td>
</tr>
<tr>
<td>NA Day 1</td>
<td>25.50 (8.74)</td>
<td>25.26 (7.27)</td>
</tr>
<tr>
<td>NA Day 2</td>
<td>21.77 (8.94)</td>
<td>20.57 (7.03)</td>
</tr>
<tr>
<td>NA Day 3</td>
<td>20.23 (8.76)</td>
<td>22.57 (8.84)</td>
</tr>
<tr>
<td>STAI Day 1</td>
<td>19.88 (3.87)</td>
<td>19.48 (3.36)</td>
</tr>
<tr>
<td>STAI Day 2</td>
<td>19.38 (4.76)</td>
<td>18.20 (4.46)</td>
</tr>
<tr>
<td>STAI Day 3</td>
<td>19.17 (5.02)</td>
<td>18.28 (4.43)</td>
</tr>
</tbody>
</table>

*Note.* Positive and Negative Affect Scale (PANAS) Positive Affect Scale (PA), PANAS Negative Affect Scale (NA), State and Trait Anxiety Inventory – 7 item version (STAI-7).
APPENDIX B: Mindfulness and Relaxation Scripts

*Mindfulness Script*

First, allow yourself to settle in here, by taking a few moments to look around the room.

Then settle into a comfortable sitting position, sitting with your back straight against the back of the chair...your feet flat on the floor...and your hands in your lap.

Now gently close your eyes part way, or all the way, whichever is more comfortable for you.

Then ask yourself, what is my experience right now? What am I thinking about? What am I feeling, emotionally? What sensations are present, in my body? Just observe and acknowledge your experience, whatever it is.

Bringing your awareness to your body, focus your attention on the sensations of touch, or pressure, where your body makes contact with the chair. Spend a moment or two exploring these sensations.

(1 minute)

Now, bring your awareness to the changing physical sensations in your lower abdomen, as the breath moves in and out, of your body. To help you become attentive to your breathing, place your hand on your lower abdomen and become aware of the changing sensations where your hand makes contact with your abdomen.

When you've tuned in to the physical sensations in this area, you can remove your hand, if you'd like, and continue to focus on the sensations in the abdomen.

Focus your awareness on the sensations of slight stretching as the abdomen rises with each in-breath, and of gentle deflation as it falls with each out-breath. As best you can, follow with your awareness the changing physical sensations in the lower abdomen, all the way through as your breath enters your body on the in-breath, and all the way through as the breath leaves your body on the out-breath...perhaps also noticing the slight pause at the end of the in-breath and the slight pause between the end of one out-breath and the beginning of the next in-breath.

Focusing on the actual sensations of breath entering, and breath leaving, the body, there's no need to think about the breath – just experience the sensations of it. And there's no need to try to control the breathing in any way. Simply let the breath be natural.

(1 minute)
As best you can, also bring the sense of allowing to the rest of your experience. There is nothing to be fixed. No particular state to be achieved. As best you can, simply allow your experience to be your experience, without needing to change it in any way.

Sooner or later, your mind will wander away from the focus on the breath in the lower abdomen, to thoughts, feelings, daydreams, drifting along, whatever. This is perfectly OK – it's simply what minds do. When you notice that your awareness is no longer on the breath, gently acknowledge briefly where the mind has been. Then, gently bring your awareness back, to a focus on the changing physical sensations in the lower abdomen, renewing your attention to pay attention to the breath coming in and the breath going out. This moment of noticing is the most important moment. As you notice your thoughts wandering, not judging yourself in any way, but rather noting these thoughts as mental events. These are just thoughts.

However often you notice that the mind has wandered, congratulate yourself each time on reconnecting with your experience in the moment, gently escorting the attention back to the breath and simply resume following in awareness the physical sensations that come with each in-breath and out-breath.

Now simply continue with this for the next few minutes, perhaps reminding yourself from time to time that the intention is simply to be aware of your experience in each moment, as best you can, using the breath as an anchor to gently reconnect with the here and now each time you notice that your mind has wandered, and is now longer down in the abdomen, following the breath.

(1 minute)

Now allow your attention to expand to your whole body: to your posture, to your facial expression, and other parts of your body. Focus on how your posture and your facial expressions feel from the inside. Perhaps allowing yourself to feel whatever sensations or thoughts are there. Opening up and being aware of whatever you see and feel, right now, in the present moment. Perhaps saying to yourself, “It’s already here. Whatever it is, it’s already here. Let me feel it.”

(1 minute)

Now slowly and gently expand your awareness further to the room you're in. And as you slowly open your eyes, become aware of what you see in front of you.
Relaxation Script

Picture yourself lying on a beautiful white sand beach. Picture your body lying in the sand, feeling the warmth of the sun on your body.

Now imagine you are walking toward the ocean...(pause 1 minute)

You can hear the waves up ahead.... you can smell the ocean spray.... the air is moist and warm.... feel a pleasant, cool breeze blowing through the trees....

You walk along a path....coming closer to the sea....as you come to the edge of the trees, you see the brilliant aqua color of the ocean ahead....

You walk out of the forest and onto a long stretch of white sand.... the sand is very soft powder.... imagine taking off your shoes, and walking through the hot, white sand toward the water...(pause 1 minute)

The beach is wide and long

Hear the waves crashing to the shore....

Smell the clean salt water and beach....

You gaze again toward the water.... it is a bright blue-green....

See the waves washing up onto the sand..... and receding back toward the ocean.... washing up.... and flowing back down..... enjoy the ever-repeating rhythm of the waves...(pause 1 minute)

Imagine yourself walking toward the water.... over the fine, hot sand.... you are feeling very hot....

As you approach the water, you can feel the mist from the ocean on your skin. You walk closer to the waves, and feel the sand becoming wet and firm....

A wave washes over the sand toward you.... and touches your toes before receding...

As you step forward, more waves wash over your feet... feel the cool water provide relief from the heat....(pause 1 minute)

Walk further into the clear, clean water.... you can see the white sand under the water.... the water is a pleasant, relaxing temperature.... providing relief from the hot sun... cool but not cold....

You walk further into the water if you wish.... swim if you want to.... enjoy the ocean for a few minutes....feeling more and more relaxed... enjoy the ocean.... (Pause 2 minutes)
Now you are feeling calm and refreshed...

You walk back out of the water and onto the beach...

Stroll along the beach at the water's edge.... Up ahead is a comfortable lounge chair and towel, just for you...

Sit or lie down in the chair, or spread the towel on the sand.... relax on the chair or towel.... enjoying the sun.... the breeze.... the waves.....

You feel peaceful and relaxed.... allow all your stresses to melt away....
APPENDIX C: Writing Instructions

N.B. The version given to participants did not indicate “Control” or “Expressive Writing” in parentheses.

**Instructions Given to All Participants:**
This study is an important project looking at writing. Over the next three days, you will be asked to write about one of several different topics for minutes each day. Your specific instructions for writing will be located on desk in the room where you will be completing your writing each day. You will complete the writing on a computer alone in a private room. The research coordinator who takes you to your room will wait with you until you have read the instructions for the day. The research coordinator will leave the room when you have finished reading the instructions and close the door as she leaves. The sound of the door closing will be your signal to begin writing. At the end of 20 minutes, the research coordinator will knock on the door and let you know that the 20 minutes are up and you can stop writing.

We ask that you write continuously for the entire 20 minutes. If you run out of things to say, just repeat what you have already written. In your writing, don’t worry about grammar, spelling, or sentence structure. Just write. Different participants will be asked to write about different topics. Therefore, we ask that you do not talk to anyone about this experiment. We can’t tell you what other participants are writing about or the nature of the predictions of this study, but we will be happy to provide you with this information once the study is complete. We expect this study to last for one year.

Sometimes participants say that they feel a little sad or anxious after writing. If that happens to you, it is normal. Most people say that these feelings go away in an hour or so once they leave the lab. If at any time over the course of the study you feel upset or distressed, please contact the primary investigator of this study, whose contact information is located on the consent form.

Keep in mind that your writing is completely anonymous and confidential. You are identified by an ID number, which is written at the top of the document onto which you will by typing. Please do not put your name anywhere in this document. Some people have said after writing that they do not want anyone else to read what they have written. That’s okay. If you don’t feel comfortable turning in your writing sample, simply tell the research coordinator and she will let you take it with you. She will also delete the document on the computer. We would prefer that you do hand in your writing sample, however, because we are interested in learning about what people write. We promise that none of the experimenters involved with this project will link your name to your writing samples.

________________________________________________________________________
Day 1: Writing Instructions (Expressive Writing)
During each of the three consecutive writing days, I would like you to write about the most upsetting and troublesome worry topic that is bothering you right now. For each of the three days you can write on different topics each day or the same topic for all three days. The important thing is that you write about your deepest thoughts and emotions in relation to this worry topic.

Day 2: Writing Instructions (Expressive Writing)
Today please continue to write about the most upsetting and troublesome worry topic that is bothering you right now. It can be the same or different from what you wrote about yesterday. Remember to write about your deepest thoughts and emotions about this worry topic.

Day 3: Writing Instructions (Expressive Writing)
Today is the last writing session. In your writing today, please continue to write about the most upsetting and troublesome worry topic that is bothering you right now. It can be the same or different from what you wrote about for the last two days. Remember to write about your deepest thoughts and emotions about this worry topic.

Day 1: Writing Instructions (Control)
During each of the next three consecutive writing days, I would like you to write about how you use your time. Each day, you will be writing about everything you did from waking up in the morning to coming here. In your writing, be as objective and as detailed as possible. We are not interested in your emotions or opinions. Remember to describe the events of your day as accurately and objectively as possible.

Day 2: Writing Instructions (Control)
Today please describe again everything you did yesterday from the time you left the first writing session to the time you came here. In your writing, be as objective and as detailed as possible. We are not interested in your emotions or opinions. Remember to describe the events of your day as accurately and objectively as possible.

Day 3: Writing Instructions (Control)
You have written now for two days about how you have spent your time, and today is the last day. In your writing today, please write again about everything you have done from waking up in the morning to coming here. In your writing, be as objective and as detailed as possible. We are not interested in your emotions or opinions. Remember to describe the events of your day as accurately and objectively as possible.
APPENDIX D: Debriefing Statement

Debriefing Handout

Thank you for your participation in the “Coping Strategies for Worry” study. We appreciate your time and commitment to this study. Worry about life situations and relationships can be distressing for some people and can really get in the way of living a valued and productive life. Individuals use a variety of strategies to manage stress and anxiety. With the help of your participation in this study, we hope to learn more about how individuals react to different strategies for worry so that we can better inform treatment of problematic worry.

People react in different ways to answering questions and writing freely about their worry and emotions. Sometimes people find it helpful to think about their experiences and emotions because it helps them to process difficult topics. Other times, people find that thinking about their emotions and experiences more deeply can make them feel more sad, nervous, or distressed. If you feel this way now or if you notice feeling this way following the conclusion of this study, please contact the study coordinator using the contact information below.

Additionally, some people find that talking to someone outside of their family or circle of friends can be helpful in understanding and managing their worry and anxiety. If you are interested in learning more about services available to you at Temple and the surrounding community, please talk to the experimenter, contact the research coordinator, or contact one of the resources listed below.

Thanks again for your participation.

Contact Information

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Philadelphia, PA 19146

Temple University and Community Resources

1) Adult Anxiety Clinic of Temple: 215-204-1575
2) Psychological Services Center, Temple University: 215-204-7324
3) Center for the Treatment and Study of Anxiety, University of Pennsylvania: 215-746-3327
4) Anxiety and Agoraphobia Treatment Center, Bala Cynwyd, PA: 610-667-6490