Evaluating a Brief Emotion Regulation Training in Reducing Worry and Rumination in Generalized Anxiety Disorder and Major Depressive Disorder

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By
Andre Joseph Plate, B.S.
Graduate Program in Psychology

The Ohio State University
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Thesis Committee
Amelia Aldao, Ph.D., Advisor
Jennifer Cheavens, Ph.D.
Michael Vasey, Ph.D.
Abstract

Generalized anxiety disorder (GAD) and major depressive disorder (MDD) are two highly comorbid and prevalent psychological disorders that have profound physical and mental health consequences (e.g., Kessler et al., 2008; Wittchen, 2002; Wittchen, Carter, Pfister, Montgomery, & Kessler, 2000). These disorders are respectively characterized by worry and rumination – two forms of repetitive negative thinking that exacerbate symptoms and emotional difficulties. In order to better understand and treat these conditions, many contemporary treatments have begun to adopt an emotion regulation (ER) framework by placing an emphasis on teaching patients to use more adaptive ER strategies, notably acceptance and reappraisal. However, less is known about the specific mechanisms by which these strategies can reduce worry and rumination in people with GAD and MDD. To investigate these ER processes, I developed and tested a brief ER training that taught people diagnosed with GAD and/or MDD (N = 41) to use acceptance and reappraisal to more effectively disengage from their most distressing worries and ruminative thoughts during a worry or rumination induction and a subsequent ER task. Contrary to my hypotheses, participants in the ER training condition were not buffered against the deleterious effects of the induction relative to those who received a control training. Moreover, during the ER task, all participants experienced a reduction in negative affect but not their use of worry and rumination, despite reporting increases in acceptance and reappraisal. Finally, there was support for the differential effects of
inducing worry versus rumination on negative affect and the use of these ER strategies. Overall, this experimental study offers a framework for examining whether utilizing more adaptive ER strategies can decrease patterns of worry and rumination. Importantly, a more sophisticated understanding of these mechanisms may help inform subsequent emotion-focused interventions for GAD and MDD.
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Vita

June 2008.................................................................Kinnelon High School

2012...............................B.S., Psychology, with distinction, The Pennsylvania State University

2014 to present..............Clinical Psychology Doctoral Student, The Ohio State University

Honors and Awards

2014 to 2015......................................................... University Fellowship, The Ohio State University

Spring 2015............................................................. Graduate Student Conference Presentation

Travel Award, The Ohio State University,
Amount: $500

Summer 2015.......................................................... College of Social and Behavioral Sciences Fellowship, The Ohio State University

Fall 2015................................................................. Graduate Student Conference Presentation

Travel Award, The Ohio State University,
Amount: $500

Spring 2016............................................................. Introduction to Psychology Instructional Program Meritorious Service Award

The Ohio State University

Summer 2016.......................................................... College of Social and Behavioral Sciences Fellowship, The Ohio State University
Publications


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Specialty: Clinical Psychology
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Chapter 1: Introduction

Despite remarkable advancements in our understanding of the etiology and treatment of psychological disorders, GAD and MDD continue to pose a major burden to society in terms of personal, social, and monetary costs (e.g., Kazdin & Blase, 2011; Kessler et al., 2005; Wittchen, 2002). These disorders are associated with poor social, physical, and socioeconomic functioning, as well as a reduced quality of life and well-being (e.g., Ormel et al., 1994; Stein & Heimberg, 2004; Wittchen, Carter, Pfister, Montgomery, & Kessler, 2000). Twelve-month prevalence rates of GAD and MDD in the United States are approximately 2.9% and 7%, respectively (DSM-5; American Psychiatric Association, 2013), and the high rates of comorbidity between these conditions remain a significant concern (Kessler et al., 2008). Critically, data from large-scale epidemiological studies suggest that having comorbid GAD and MDD is associated with significantly greater functional impairment (e.g., disability, distress, utilization of mental health services, workplace absenteeism) compared to having either condition alone (e.g., Andrews, Slade, & Issakidis, 2002; Grant et al., 2005; Moffitt et al., 2007).

A hallmark characteristic of both GAD and MDD is their chronic or recurrent course, and high relapse rates (for GAD see Borkovec, 2002; Wittchen & Hoyer, 2001; for MDD, see APA, 2013; Gortner, Gollan, Dobson, & Jacobson, 1998; Vittengl, Clark, Dunn, & Jarrett, 2007). One possible explanation for the unrelenting nature of these disorders is that, at their very core, they entail a vicious cycle of repetitive negative thinking. A cardinal symptom and key diagnostic feature of GAD is worry, which
involves anxious apprehension about future threats and everyday things such as money, health, family, work, or other minor issues (Borkovec, 1994; Borkovec, Alcaine, & Behar, 2004). Additionally, GAD is characterized by excessive and uncontrollable worries that are associated with debilitating physical symptoms (e.g., restlessness, muscle tension) (APA, 2013). On the other hand, a central characteristic of MDD is rumination, which involves brooding about the causes, situational factors, and consequences of one's negative emotional experiences (Nolen-Hoeksema, 1991). Although rumination is not a specific diagnostic criterion for MDD, it is frequently seen in its clinical presentation (APA, 2013). Moreover, mounting empirical support suggests that rumination maintains, exacerbates, and prolongs depressive episodes (see Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008 for reviews).

Currently, there are a number of evidence-based treatments for people suffering from GAD and/or MDD. The most empirically supported treatment for these conditions is cognitive behavioral therapy (CBT) (e.g., Butler, Chapman, Forman, & Beck, 2006; Covin, Ouimet, Seeds, & Dozois, 2008; Dobson, 1989; Hunot et al., 2013; Hunot, Churchill, Teixeira, & Silva de Lima, 2007; Shinohara et al., 2013). Overall, a theoretical underpinning of CBT involves treating psychopathology from primarily a cognitive perspective (Beck, 1979; Beck, Emery, & Greenberg, 1985). That is, worries and ruminations are viewed mainly as distorted cognitions that can be evaluated and modified in order to improve a person’s overall mental health. CBT includes therapeutic techniques such as cognitive restructuring (e.g., using a thought record) to teach patients to identify their negative automatic thoughts (e.g., worries and ruminative thoughts), evaluate the evidence for and against these thoughts in an objective way, and modify
them to be more adaptive and realistic in order to improve their mood (e.g., Beck, 1979; Beck, 2011; Zinbarg, Craske, & Barlow, 2006).

Despite the vast empirical support for the efficacy of CBT as the frontline treatment for both GAD and MDD, it is not always effective for every patient and relapse rates are high. For instance, approximately 50% of patients with GAD fail to reduce their anxiety to normal levels after being treated with CBT (Borkovec, 2002). Furthermore, a meta-analysis found that although CBT for GAD is very effective in reducing short-term anxiety symptoms and worry at the end of treatment, very few treatment outcome studies examine the long-term effectiveness of CBT for GAD (Hunot et al., 2007). This is problematic because it precludes researchers from making inferences about the long-term impact that CBT might have for patients with GAD. Thus, although CBT is efficacious, it does not always work for every patient and less is known about the sustained effects that this treatment may have.

A similar pattern emerges when examining the high relapse rates associated with MDD. A meta-analysis of 28 studies including 1,880 adults with MDD found that many responders to standard CBT later relapse, including 29 percent within one year and 54 percent within two years (Vittengl et al., 2007). Another treatment outcome study for MDD compared patients who responded to cognitive therapy (CT) versus antidepressants and assessed relapse rates in the year following treatment (Hollon et al., 2005). Although they found that those who responded to antidepressants had higher relapse rates (76.2 percent), nearly one in three people (30.8 percent) who responded to CT ended up relapsing in the following year (Hollon et al., 2005; also see Lin et al., 1998 for a similar relapse rate).
To address this concern, researchers and clinicians have sought to explore novel ways to improve upon current conceptualizations of GAD and MDD. One contemporary approach that has been progressively utilized over the past two decades has been the adoption of an emotion regulation (ER) framework (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Cicchetti, Ackerman, & Izard, 1995; Kring & Sloan, 2009; Mennin, Holaway, Fresco, Moore, & Heimberg, 2007; Sheppes, Suri, & Gross, 2015; Werner & Gross, 2010). ER refers to the processes whereby people modulate which emotions they have, their duration or intensity, and how these emotions are expressed (Gross, 1998b). James Gross was highly influential in this movement when he proposed his process model of emotion regulation, which posited that people have emotional response tendencies (e.g., behavioral, experiential, physiological) that often need to be regulated at various points throughout the emotion generative process (Gross, 1998a, 1998b, 2015). Importantly, this ER framework has been specifically applied to GAD and MDD, particularly by studying various domains of emotion dysregulation in these disorders.

People with GAD exhibit dysfunctional physiological and subjective reactivity to emotional stimuli (Llera & Newman, 2010). Additionally, these individuals often possess few skills necessary to modulate their emotions (Mennin, Heimberg, Turk, & Fresco, 2002, 2005), which results in them relying on worry as an ineffective method for coping with difficult emotions (e.g., Borkovec, 1994; Borkovec & Roemer, 1995; Borkovec et al., 2004). In MDD, a meta-analysis on emotional reactivity found that depressed people exhibit blunted emotional reactivity to both positive and negative stimuli (Bylsma, Morris, & Rottenberg, 2008). Moreover, rumination is a strategy that is often implemented by depressed individuals to regulate and cope with distress, despite the fact...
that it has a paradoxical effect of maintaining or prolonging it (Nolen-Hoeksema et al., 1993; Nolen-Hoeksema, 1998; Nolen-Hoeksema et al., 2008). As such, many researchers have are now systematically translating this work on emotion dysregulation to treatments for GAD and MDD in the form of emotion-focused psychological interventions (e.g., Berking et al., 2008; Berking & Whitley, 2014; Kring & Sloan, 2009; Mennin & Fresco, 2009; Werner & Gross, 2010).

One of the earliest emotion-focused treatments was Dialectical Behavior Therapy (DBT), which views emotion dysregulation as an overarching theme underlying psychopathology (Linehan, 1993). Although DBT is typically used to treat borderline personality disorder and chronically suicidal individuals (e.g., Linehan, 1993; Linehan et al., 2006; Linehan, Armstrong, Suarez, Allmon, & Heard, 1991), the DBT Skills Training (DBT-ST; Linehan, 2014) has now been adapted as a stand-alone treatment for depressed and/or anxious patients (e.g., Harley, Sprich, Safren, Jacobo, & Fava, 2008; Neacsiu, Eberle, Kramer, Wiesmann, & Linehan, 2014). DBT utilizes a variety of skills grounded in acceptance (e.g., mindfulness, distress tolerance, radical acceptance), and even some reappraisal strategies (e.g., “check the facts”) to a lesser extent (see Linehan, 2014 for more detailed information on specific DBT skills). A recent randomized controlled trial tested DBT-ST in patients suffering from depression and anxiety, and found that DBT-ST was effective in reducing emotion dysregulation, anxious and depressive symptoms, and increasing skills use (Neacsiu et al., 2014). However, the precise impact that these skills may have on worry and rumination in anxious and depressed individuals remains to be tested.
Acceptance-based therapies primarily grew out translating mindfulness practices to clinical interventions (see reviews by Baer, 2003; Kabat-Zinn, 2003) and typically emphasize the non-judgmental acceptance of emotions that are experienced in the moment (Hofmann & Asmundson, 2008). One such example is Acceptance and Commitment Therapy (ACT; Hayes et al., 1999), which focuses on bolstering acceptance skills in order to counteract experiential avoidance and psychological inflexibility (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Hayes et al., 1999). A randomized clinical trial demonstrated that ACT was equally efficacious as “traditional” CBT in treating people with mixed anxiety disorders and depression (Arch et al., 2012). Of note, both ACT and CBT were shown to reduce anxiety symptoms (e.g., worry), and increase the use of acceptance. A more novel treatment, acceptance-based behavior therapy (ABBT) for GAD, has also been shown to produce significant reductions in worry, and anxiety and depressive symptoms in early clinical trials (Roemer & Orsillo, 2007; Roemer, Orsillo, & Salters-Pedneault, 2008; Roemer, Williston, Eustis, & Orsillo, 2013). Overall, these results highlight the utility of focusing on increasing the use of ER strategies such as acceptance in order to reduce symptoms and the use of maladaptive ER strategies such as worry.

The Unified Protocol (UP) is a transdiagnostic CBT intervention designed to treat disorders in which emotion dysregulation is a cardinal feature, such as anxiety disorders and depression (Allen, Kathryn, & Barlow, 2008; Barlow et al., 2010). The UP contains specific modules designed to increase non-judgmental acceptance and improve cognitive flexibility (i.e., cognitive appraisal and reappraisal) (Barlow et al., 2010). Overall, the UP has shown promising clinical outcomes in reducing general symptoms of anxiety and
depression in emotional disorders, specifically by targeting reappraisal and acceptance as two primary skills developed throughout treatment (Ellard, Fairholme, Boisseau, Farchione, & Barlow, 2010; Farchione et al., 2012).

Rumination-focused CBT (Watkins et al., 2007; Watkins et al., 2011) was developed specifically to target rumination in people with treatment-refractory MDD. In this treatment, depressed patients utilize functional analysis to identify behavioral triggers associated with rumination (e.g., procrastinating on a task), and then develop alternative behaviors to counter the ruminative cycle (e.g., successful engagement in the task). Preliminary evidence showed that a small sample of patients (N = 14) with treatment-refractory MDD experienced significant reductions in depressive symptoms, rumination, and comorbid disorders compared to a treatment-as-usual group (Watkins et al., 2007). These results were replicated in a randomized controlled trial that provided further support for rumination-focused CBT effectively reducing depression, rumination, and symptoms of comorbid disorders, most notably GAD (Watkins et al., 2011).

Drawing on basic findings from the affective science literature, Emotion Regulation Therapy (ERT; Mennin & Fresco, 2013a) was developed to treat GAD and co-occurring MDD by improving ER abilities in order to decrease the reliance on worry and rumination. In the first phase of treatment, patients learn various skills to enhance emotional awareness and acceptance, and they also learn various forms of reappraisal (e.g., positive reappraisal, compassionate reappraisal, realistic reappraisal; see Mennin & Fresco, 2013a for a detailed review of these types of reappraisal). These skills are then utilized during the second phase of treatment, which consists of behavioral activation and exposures that allow patients to break the recurring pattern of using emotional avoidance
strategies such as worry and rumination. Of note, ERT has demonstrated promising clinical outcomes including reductions in symptoms of GAD and depression, worry and rumination, as well as increases in acceptance and reappraisal, as well as improvements in quality of life (Mennin & Fresco, 2013b; Mennin, Fresco, Ritter, & Heimberg, 2015).

Overall, these newer, emotion-focused CBT treatments appear to be promising in treating GAD and MDD. However, a key limitation to the currently available treatments for GAD and MDD is that our understanding of the specific mechanisms underlying these treatments (i.e., how they work) is relatively nascent in the field of clinical psychology (for a discussion, see Plate & Aldao, in press). As such, more research is needed on the ER processes that might serve as a necessary mechanism for therapeutic change to occur. This is a key gap in the literature because having a more in-depth understanding of the ER mechanisms that are essential to attain optimal treatment outcomes for GAD and MDD provides an opportunity to refine and enhance currently available psychological treatments. In turn, this may ultimately lead to enhanced efficacy of interventions for GAD and MDD.

One promising area for bolstering our understanding of these specific ER processes lies in expanding upon the extant research on ER strategies. James Gross’ process model suggested people could use a variety of ER strategies (i.e., specific techniques utilized to regulate emotions) at various points throughout the process of an emotion being generated, experienced, and expressed. Importantly, individual differences in the utilization of ER strategies have been repeatedly associated with mental health outcomes (e.g., Aldao, Jazaieri, Goldin, & Gross, 2014; Aldao & Nolen-Hoeksema, 2012; Conklin et al., 2015; Gross & John, 2003; Hofmann, Heering, Sawyer, & Asnaani,
Aldao and colleagues (2010) sought to summarize this body of work on ER strategies by conducting a meta-analysis examining the relationships between the use of ER strategies and symptoms of anxiety, depression, eating disorders, and substance abuse. Some ER strategies had negative associations with psychopathology symptoms such as reappraisal (r = -.14) and acceptance (r = -.19) and therefore, were characterized as adaptive. On the contrary, other ER strategies such as rumination (r = .49) had positive associations with psychopathology symptoms and were therefore characterized as maladaptive (Aldao et al., 2010). Building off this body of work, many ER-based approaches have begun to conceptualize worry and rumination as maladaptive ER strategies in the context of GAD and MDD (e.g., Joormann & Gotlib, 2010; Mennin et al., 2002, 2005; Newman, Llera, Erickson, & Przeworski, 2014; Susan Nolen-Hoeksema et al., 2008; Roemer et al., 2009; Salters-Pedneault, Roemer, Tull, Rucker, & Mennin, 2006).

Critically, the maladaptive ER strategies of worry and rumination share a number of overlapping features, which may offer clarification on the nature of these highly comorbid conditions. In addition to their perseverative nature, worry and rumination are both characterized as over general and inflexible forms of self-focused thoughts that are associated with difficulties in attention and problem solving (e.g., Borkovec, Alcaine, & Behar, 2004; Nolen-Hoeksema et al., 2008; Watkins, 2008). Recently, they have been conceptualized as forms of negative self-referential processing that may play a significant role in the etiology and maintenance of anxious and depressive symptoms (Mennin & Fresco, 2013b). Given these similarities, a significant amount of research has been devoted to delineating whether worry and rumination are more similar than distinct. That 2009; Kashdan, Zvolensky, & McLeish, 2008; Plate, Aldao, Quintero, & Mennin, 2016).
is, some research posits that worry and rumination might be better accounted for by one transdiagnostic construct of negative repetitive thinking that cuts across GAD and MDD (e.g., Ehring & Watkins, 2008; Spinhoven, Drost, van Hemert, & Penninx, 2015). For example, in one study that included both healthy undergraduates and a clinical sample, structural equation modeling was used to identify a latent variable of repetitive thought that was significantly associated with both depression and anxiety (Segerstrom, Tsao, Alden, & Craske, 2000). Another recent study found that levels of worry and rumination did not significantly differ between those diagnosed with “pure” GAD or MDD, and that having higher levels of repetitive negative thinking (i.e., both worry and rumination) was associated with greater GAD+MDD comorbidity (McEvoy, Watson, Watkins, & Nathan, 2013). Overall, these findings are aligned with research showing that they are highly correlated with each other, with correlation estimates ranging from .46 to .55 (e.g., Fresco, Frankel, Mennin, Turk, & Heimberg, 2002; Muris, Roelofs, Meesters, & Boomsma, 2004; Segerstrom et al., 2000; Watkins, 2004; Watkins, Moulds, & Mackintosh, 2005).

Despite their similarities, a number of studies have provided evidence suggesting that worry and rumination may be best conceptualized as distinguishable constructs (e.g., Hong, 2007; Muris et al., 2004; Watkins et al., 2005; Wisco, Plate, & Aldao, in preparation). For instance, an exploratory factor analysis found that items from self-report measures of worry and rumination loaded onto different factors, suggesting that these constructs may represent distinct cognitive processes (Fresco et al., 2002). Congruent with this hypothesis, worry and rumination can also be differentiated on a number of critical dimensions. At the conceptual level, they differ in their functions, time
orientation, degree of certainty, and controllability. Worry is enacted in response to uncertainty regarding one’s ability to control anticipated threats. As such, worry tends to be future-oriented. By reducing or avoiding anxious arousal and negative affect, worry is often negatively reinforced (Borkovec, 1994; Borkovec et al., 2004; Mennin & Fresco, 2013). Moreover, worry may also be an ineffective cognitive attempt to problem solve that is used to avoid emotional processing and emotional experiences (Borkovec, 1994; Borkovec et al., 2004). In addition, excessive and uncontrollable worry (as is seen in GAD) is associated with heightened intensity of emotions, poor emotional understanding, greater negative reactivity to emotions, and maladaptive attempts to manage these emotions (Mennin et al., 2002, 2005). Further, it has been suggested that people with GAD may worry in order to prolong and maintain their negative emotional states, thereby avoiding an unexpected and contrasting shift towards negative affect (Newman & Llera, 2011).

On the contrary, rumination centers on feelings of loss and failure, and as such, it is often associated with feelings of sadness, dejection, and depression (Nolen-Hoeksema, Morrow, & Fredrickson, 1993; Nolen-Hoeksema, 1991; Nolen-Hoeksema & Morrow, 1993). Rumination also involves perseverating on perceived shortcomings and mistakes, emotions (mostly sadness), and the possible causes and consequences of these emotions. Accordingly, rumination tends to be past-oriented. In all, rumination may foster a sense of certainty that a situation is hopeless and uncontrollable, thereby providing an individual with justification for avoiding and withdrawing from aversive situations (Nolen-Hoeksema et al., 2008). Rumination might also exacerbate emotional difficulties through various mechanisms. For example, people who habitually ruminate exhibit
cognitive and attentional difficulties when attempting to process and inhibit negative affect (e.g., Gotlib & Joormann, 2010; Mogg & Bradley, 2005).

From an affective science perspective, a critical question then is how adaptive ER strategies (i.e., acceptance and reappraisal) might be beneficial in reducing the use of maladaptive ER strategies (i.e., worry and rumination) in GAD and MDD. One promising method for addressing this question is to conduct laboratory-based experimental studies, which offer researchers a context for identifying the specific mechanisms that can ameliorate symptoms and emotion dysregulation in GAD and MDD. That is, experimental research provides a medium for developing an understanding of the nature of GAD and MDD by carefully isolating and manipulating the specific ER processes that are at the core of these psychological disorders and their treatment.

A number of laboratory-based studies have begun to address this question using experimental paradigms. One study administered an idiographic, negative mood induction to patients with remitted MDD who were at a high risk of relapse (Singer & Dobson, 2007). Half of the participants were randomized to an acceptance training procedure, which taught them to bring their awareness to their current emotions, thoughts, and physical sensations, and simply allow themselves to experience these things and hold them in the present moment. The other half received a rumination training that asked them to concentrate their attention on thoughts that were self-focused on their symptoms and emotions (Nolen-Hoeksema, 1991). Results of this study revealed those participants in the rumination condition maintained their intensity of dysphoria following the negative mood induction, whereas those trained to use acceptance exhibited significant decreases in dysphoria intensity (Singer & Dobson, 2007). Thus, this study
points to the benefits of acceptance in people with a history of MDD who have a tendency to engage in rumination.

Another study used a similar methodology to examine the differential effects of rumination versus reappraisal in MDD (Kross, Gard, Deldin, Clifton, & Ayduk, 2012). Depressed and non-depressed participants were instructed to reflect on a depressing life event, and were then assigned to either a self-immersed rumination condition (i.e., self-focused thoughts on why they felt that way) or a self-distanced condition (i.e., a form of reappraisal designed to take a step back and reframe their perspective to that of a distanced observer). Participants with MDD who were instructed to utilize this form of reappraisal reported lower levels of negative affect and depressive thoughts than those who engaged in self-immersed rumination. In other words, this distanced form of reappraisal served as a buffer against heightening negative affect and cognition when participants were prompted to analyze their feelings about a personally relevant, depressing life event. Interestingly, self-distancing did not significantly influence negative affect or depressive thoughts among the non-depressed participants, indicating that this form of reappraisal might be most beneficial for those individuals who are currently suffering from MDD (Kross et al., 2012).

Other studies have applied similar experimental techniques to assess the benefits that using adaptive ER strategies such as acceptance provide relative to worry. One such research study presented participants with negatively-valenced pictures from the International Affective Picture System (IAPS) and randomized participants to one of three conditions: 1) worry, 2) acceptance/mindfulness during a focused breathing exercise, or 3) an unfocused attention group (Arch & Craske, 2006). Specifically,
participants in the acceptance/mindfulness group were told to focus on their breathing, direct their attention and awareness to whatever sensations they were experiencing in the present moment, and stay in contact with them and accept them. Participants in the acceptance/mindfulness condition reported lower levels of negative affect than those in the worry condition, and they also reported a greater willingness to view pictures designed to elicit high levels of negative emotions than the unfocused attention group (Arch & Craske, 2006).

Aldao and Mennin (2012) employed a similar design where they examined the effects of adaptive strategies (i.e., acceptance and reappraisal) in non-anxious controls and participants diagnosed with GAD and comorbid depression symptoms. Specifically, they randomly assigned participants to an acceptance, reappraisal, or a no-regulation instructions condition as they viewed emotion-provoking film clips (e.g., anxiety, sadness). They found that, regardless of diagnostic status (e.g., GAD or control), reappraisal was most effective at down-regulating negative affect during the emotional film clips, whereas acceptance was not significantly different than the no-regulation instructions condition. However, their most interesting results came when they predicted heart rate variability (HRV), a physiological index of cardiac functioning mediated by the parasympathetic nervous system, which has been associated with flexible and adaptive regulation (Thayer, Åhs, Fredrikson, Sollers III, & Wager, 2012). When participants with GAD utilized either reappraisal or acceptance, they demonstrated lower cardiac flexibility (i.e., lower HRV) compared to when they were not given any instructions. In contrast, the non-anxious controls demonstrated higher cardiac flexibility (i.e., higher HRV) when using these adaptive ER strategies compared to when they were not given
specific regulation instructions (Aldao & Mennin, 2012). Overall, these results demonstrate that participants with GAD experience a deleterious cardiac response when implementing acceptance and reappraisal, suggesting that there may be a physiological cost to adaptive ER.

Although the laboratory-based experimental studies previously described are by no means exhaustive, they have begun to explore the differential effects that adaptive ER strategies (i.e., acceptance and reappraisal) have in comparison to maladaptive ER strategies (i.e., worry and rumination). In some cases, studies have even examined how utilizing adaptive ER strategies might be one mechanism used to counteract the detrimental effects of engaging in worry or rumination. However, this line of work needs to be extended in a few key ways in order for the field to have a firmer understanding of the nature of worry and rumination in people diagnosed with GAD and MDD. First, additional laboratory-based experimental studies are needed to further elucidate the specific mechanisms by which increasing the use of adaptive ER strategies that are commonly used in psychological interventions (i.e., acceptance and reappraisal) can help reduce worry and rumination in GAD and MDD.

Second, much of the experimental studies on ER frequently instruct participants to use only one ER strategy in response to negative mood inductions (e.g., using rumination or acceptance in response to a negative mood induction). However, ER strategies rarely act in isolation from one another, but rather are part of a diverse repertoire of strategies that can be flexibly implemented (Aldao, Sheppes, & Gross, 2015; Bonanno & Burton, 2013; Plate et al., 2016). For example, a person with GAD might “shop around” for the most effective ER strategy when trying to manage his or her
worries. If they try to reappraise their worry, and are not effective in reducing anxious arousal, perhaps they can then try to accept their thoughts (e.g., worries) and physical sensations (e.g., muscle tension) in a non-judgmental way. Along these lines, more research is needed on the use of both acceptance and reappraisal, rather than one strategy or the other.

Third, many experimental studies conducted in the laboratory (like those described above) provide specific instructions to research participants prompting them to utilize a particular ER strategy (e.g., rumination, distraction, acceptance). However, this design might compromise external validity when seeking to understand ER processes, as people in the “real world” are rarely given instructions to regulate their emotions in their own environments (especially those diagnosed with GAD or MDD). As such, experimental methodologies need to be expanded above and beyond giving ER instructions to participants. Rather, what may be more important is to train them to effectively use ER strategies in the laboratory through various methods such as didactic presentations (e.g., learning about strategies and how they are used), repeated practices using these ER strategies, receiving corrective feedback (as is done by a therapist in psychotherapy), and applying these strategies to personally-relevant worries and ruminations. In this manner, these strategies might become engrained in their repertoire of ER strategies (akin to adding a tool into a toolbox), and thus, can be implemented as needed in a “real world” context, such as when they find themselves getting stuck in a cycle of worrying or ruminating.

In order to build off prior research and address these concerns, I developed and tested a brief ER training experiment that taught people diagnosed with GAD and/or
MDD to use two ER strategies (acceptance and reappraisal) that are often the focal points in psychological interventions (e.g., Barlow et al., 2010; Mennin & Fresco, 2013a; Roemer et al., 2008). Specifically, this laboratory-based training was designed to directly target and reduce the most distressing worries and ruminations that people with GAD and/or MDD experience, specifically through training them to use acceptance and reappraisal.

Importantly, the ER training combined these two strategies to more accurately reflect the way in which they are taught in the context of psychosocial interventions (e.g., Aldao, Jazaieri, Goldin, & Gross, 2014; Barlow et al., 2010; see also McRae, Ciesielski, & Gross, 2012 for how acceptance can be viewed as a form of cognitive reappraisal) as well as how they are flexibly implemented in the “real world” (e.g., Bonanno & Burton, 2013; Kashdan & Rottenberg, 2010). Participants diagnosed with GAD and/or MDD were trained to use these ER strategies prior to undergoing four idiographic worry and rumination inductions in the laboratory. After each worry or rumination induction, they engaged in an ER task where they were given a brief period of time to manage their emotions in response to the preceding induction. Critically, this was one method for assessing whether or not these ER strategies became a part of their regulatory repertoire and would be implemented in a spontaneous (rather than instructed) way. Moreover, these personalized inductions were related to the two most distressing worries and two most distressing ruminations that these people with experienced in their daily lives that may be functioning to maintain and/or exacerbate their symptoms. In this way, this research design expands upon the standardized rumination and worry inductions that are frequently utilized in the ER literature (e.g., Nolen-Hoeksema & Morrow, 1993).
Therefore, this study provides a glimpse into better understanding the processes by which adaptive ER strategies can be used to stop the vicious cycles of worry and rumination in GAD and MDD.

In order to examine the effects of this training on participants’ idiographic experience of rumination and worry in everyday life across a number of contexts, this study design also included a 10-day diary assessment. The daily diary assessments were split into two phases: five diaries before the in-lab training and five diaries afterwards. However, given the multi-faceted nature of this study design, I elected to only focus on the data from the training experiment completed in the laboratory for my thesis rather than the diary data. The rationale for this is that the experimental paradigm is the most robust way of testing my study hypotheses pertaining to the ER processes that can help reduce worry and rumination in GAD and MDD, such as training participants to use the ER strategies of acceptance and reappraisal. However, the diary assessments were still included in the methods section below in order to describe the laboratory experiment in greater detail. In particular, the analyses in the present study examine the first overall induction (out of the four total worry and rumination inductions) that participants underwent in the experiment and the subsequent ER task completed in response to this induction. The rationale for only focusing on the first overall induction was to examine a snapshot of the experimental paradigm where participants would first encounter a shift towards increases in worry, rumination, anxiety, and sadness after receiving the ER training.

Hypotheses
I have formulated the following hypotheses regarding the effects of ER training on the ensuing mood induction and ER task completed in the laboratory (see Figure 1 for a detailed study flow of the laboratory session):

**Hypothesis #1:** I predicted that, during the first overall induction, participants in the ER training condition would report: 1) lower state-level anxiety and sadness, 2) lower state-level use of worry and rumination, and 3) higher state-level use of acceptance and reappraisal compared to those in the control condition.

**Hypothesis #2:** I predicted that, during the ER task following the first overall induction, participants in the ER training condition would report: 1) lower state-level anxiety and sadness, 2) lower state-level use of worry and rumination, and 3) higher state-level use of acceptance and reappraisal compared to those in the control condition.

**Exploratory Hypothesis #1:** Given that the four inductions were completed in a counterbalanced order, some participants received a worry induction first overall, whereas others received a rumination induction. Thus, I sought to examine whether there were any functional differences between these specific types of inductions. Given that participants learned about the nature of worry and rumination in a more differentiated way (see methods section below and Appendix B), I anticipated that the worry and rumination inductions would have greater specificity in terms of their effects on negative affect and the use of worry/rumination. I predicted that the *worry* induction would lead to greater increases in state-level anxiety and worry relative to sadness and rumination. I also predicted that the *rumination* induction would lead to greater increases in state-level sadness and rumination relative to anxiety and worry.
Chapter 2: Methods

Participants and Recruitment

Participants were between the ages of 18-55 and included Ohio State University undergraduates as well as members of the general community. Undergraduate students were able to sign up for this research study via the Research Experience Program (REP). Those recruited from the community responded to flyers placed in the broader Columbus area. All recruitment materials advertised a diary study of emotions that consisted of: 1) completing diary entries over the course of 10 days, and 2) participating in one experiment conducted in the laboratory halfway through the study. These materials directed participants to a Qualtrics link that contained the pre-screening questionnaires (see below) so that I could determine their eligibility. Participants who signed up via the REP received course credit, whereas those recruited from the general community received monetary compensation ranging from $1 to $48 ($M = $22, $SD = $20.11). Compensation was designed to maximize compliance and minimize attrition (see Appendix A).

Pre-Screening

All participants completed two pre-screening questionnaires to assess for elevated symptoms of GAD and/or MDD so that I could identify potential participants who may meet diagnostic criteria for either of these disorders. Participants were eligible and invited to enroll in the present study if they had a score of 10 or greater on the GAD-7
(Spitzer, Kroenke, Williams, & Löwe, 2006), or a score of 16 or greater on the Centers for Epidemiological Studies – Depression Scale (CES-D, Radloff, 1977). These two measures have demonstrated excellent psychometric properties and have been reliably used as pre-screening measures in prior research (see Measures section below).

I excluded participants from the pre-screening if they reported being non-native speakers of English. I established this exclusion criterion because my assessments of emotion and the specific ways in which people utilize ER strategies require a nuanced understanding of the English language that may not be present in non-native speakers.

**Online Informed Consent**

I sent a recruitment email to those participants who met the designated pre-screening cutoffs that contained a link to a Qualtrics survey, where they were given the opportunity to provide online consent and enroll in the study if they were interested. After providing consent, they filled out basic demographic information (e.g., age, sex, ethnicity, medication use). At this point, a research assistant contacted the participants to schedule the experimental session in the Psychopathology and Affective Sciences (PAS) laboratory after Phase One of the diary entries would be completed.

**Diary Assessment: Phase 1 (Days 1-5)**

The first diary entry was completed immediately after providing online informed consent. For the subsequent four days, participants received an automated email generated via Qualtrics at 7:00pm containing a link to complete the diary. Each link expired after 24 hours in order to prevent participants from completing all the diary entries at once (e.g., at the end of the study). Participants were informed that if they did not complete one of the diary entries, they were not able to make up for it, as the study
consists of an examination of emotions over an uninterrupted period of five days for each diary phase. Participants were also told that if they did not complete two or more diary entries in Phase One, they may not be eligible to complete the in-lab session.

The diaries began with descriptions of what worry and rumination are to ensure that participants understood the constructs that they were being asked to report on. An example of worry and rumination were also provided. Each example contained bullet points describing why these are model examples of worry and rumination (see Appendix B). Afterwards, participants completed a four-question quiz on the differences between worry and rumination (see Appendix C). They were informed that they were not able to continue with the diary entry until they correctly answered all four questions. If one or more of the questions were not answered correctly, the screen prompted the participant to review his or her incorrect answer choices and try again. This process was done at the beginning of each diary to ensure that participants fully comprehended the differences between worry and rumination, and could apply their knowledge to relevant examples. Upon passing the quiz, participants continued completing the diary entry.

Participants were then instructed reflect on the past 24 hours and describe in detail the following: 1) the most intense worry that they experienced, and 2) the most intense rumination that they experienced. They reported on the context of these worries/ruminations, including their emotional reactions, thoughts, and physiological experiences. A research assistant recorded these specific worry and rumination text-entry descriptions for each completed diary entry in a de-identified spreadsheet to be used for the experiment in the laboratory (see Session Preparation Section below). During the in-lab session, participants would be asked to focus on their own worry or rumination
descriptions during idiographic worry or rumination inductions. The rest of the diary assessed the participant’s general use of worry and rumination, symptoms of GAD and MDD, use of ER strategies, and a location that they visited that day.

Participants completed diary entries for the first five days of the study (i.e., Phase One). On day five, participants completed a series of questionnaires on Qualtrics in addition to completing the standard diary entry (see Measures section below). After the link to the fifth diary entry expired (i.e., 24 hours after participants receive it), participants were given a seven-day time period to complete the in-lab session. If the participant did not complete this session within the allotted time period, they were informed that they were no longer able to continue participating in the study, and they were be compensated for the portions of the study that they completed. This deadline to complete the laboratory session was established in order to ensure that the worries and ruminations that participants would be focusing on in the experiment would still be temporally relevant to them.

**Lab Session: SCID-I Assessment**

After obtaining informed consent, participants were then assessed for the presence of psychological disorders using the *Structured Clinical Interview for DSM-IV-TR* (SCID-I; First, Spitzer, Gibbon, & Williams, 2002). Clinical psychology graduate students (including myself) conducted the diagnostic assessments. All interviewers were trained to administer the SCID-I by Dr. Amelia Aldao, a licensed doctoral-level clinical psychologist with extensive experience assessing and diagnosing anxiety and mood disorders. Diagnostic reliability was determined using the clinician severity rating (CSR) from the *Anxiety Disorders Interview Schedule for DSM-IV* (ADIS; DiNardo, Brown, &
Barlow, 1994). The CSR is a 0-8 rating scale that is commonly used to measure symptom severity based on distress and impairment. A score of four is typically used as a diagnostic threshold that corresponds to clinically significant impairment. Higher CSR scores are indicative of greater symptom severity and functional impairment.

At the consensus diagnosis meeting, the graduate student who conducted the SCID-I assessment presented the participant’s case to the other graduate students and Dr. Aldao. The interviewer then answered any questions about the participant’s symptoms or clinical presentation that were relevant to making a diagnosis. After the diagnoses were agreed upon, each person reported their independently determined CSR. Any discrepancies were discussed until a consensus CSR was agreed upon by the group. Afterwards, we assigned each participant a confidence rating that assessed how confident we were in assigning a particular individual his or her diagnoses and corresponding CSR. This rating scale ranged from 1 “not confident at all” to 5 “very confident.”

Participants who met diagnostic criteria for current GAD and/or MDD were eligible to continue with the rest of the experiment. Participants were excluded if they reported: 1) current moderate to severe suicidal ideation (e.g., a current suicide plan, past suicide attempts) or severe non-suicidal self-injury (e.g., cutting), 2) symptoms of psychosis (e.g., hallucinations, delusions), or 3) symptoms consistent with bipolar disorder (e.g., a current manic episode). Participants were also excluded if they did not meet diagnostic criteria for current GAD or MDD. Those who were not eligible based on diagnostic information collected from the SCID-I were compensated for their participation and debriefed.

Lab Session: Self-Report Questionnaires
After completing the SCID-I assessment, participants completed the following self-report questionnaires on Qualtrics.

**Centers for Epidemiological Studies – Depression Scale (CES-D).** The CES-D (Radloff, 1977) is a 20-item questionnaire that assesses symptoms of MDD. Each item ranges from 0 “rarely” to 3 “most of the time” and sample items include “I felt depressed.” Total scores range from 0 to 60, with higher scores indicating greater depressive symptoms. A cutoff of 16 has been used to indicate clinically significant levels of depression in a treatment-seeking sample. The total score has been shown to have very good internal consistency ($\alpha = .89$; Radloff, 1977). Internal consistency in the present study was very good ($\alpha = .88$).

**GAD-7.** The GAD-7 (Spitzer et al., 2006) is a brief clinical measure used for assessing symptoms and identifying probable cases of GAD. The GAD-7 specifically asks about problems that may have been experienced over the past two weeks and contains seven items (e.g., “worrying too much about different things”). Each item ranges from 0 “not at all” to 3 “nearly every day” and total scores range from 0 to 21. A score of 10 or greater on the GAD-7 has been identified as a reasonable cutoff for identifying cases of GAD. Total scores of 5, 10, and 15 may be interpreted as representing mild, moderate, and severe levels of generalized anxiety. Most patients with high scores suffer from chronic symptoms and show greater declines in functioning across many domains. The GAD-7 has demonstrated excellent internal consistency in prior studies ($\alpha = .92$; Spitzer et al., 2006). Internal consistency in the present study was very good ($\alpha = .82$).

**Generalized Anxiety Disorder Questionnaire – IV (GADQ-IV).** The GADQ-IV (Newman et al., 2002) is a 14-item self-report measure that assesses symptoms of
GAD as described in DSM-IV-TR (American Psychiatric Association, 2000). Five items are dichotomous and measure the excessiveness and uncontrollability of worry, including one “skip-out” question that prompts the respondent to skip the remaining questions if they have not experienced such worries more days than not for the past six months. One item is open-ended and asks for a list of the most frequent worry topics. Six items ask about the presence of physical symptoms (e.g., muscle tension, restlessness) that may have been experienced as outlined in the DSM-IV-TR criteria for GAD. The final two items measure the clinical distress and functional impairment associated with excessive worry and anxiety on a 9-point scale. Total scores range from 0 to 13 and a clinical cutoff score of 5.7 has been identified in prior research (Newman et al., 2002). According to the authors, analysis of internal consistency is not appropriate as the skip-out instruction can inflate internal consistency estimates. However, the GADQ-IV has demonstrated good concurrent validity, test-retest reliability, and the ability to differentiate individuals with clinical and non-clinical levels of GAD (e.g., Newman et al., 2002).

Ruminative Responses Scale - Brooding Subscale (RRS-B). The RRS (Treynor, Gonzalez, & Nolen-Hoeksema, 2003) is a 22-item measure that assesses the tendency to engage in ruminative thought processes. Treynor and colleagues (2003) have removed those items with a high content overlap with depressive symptoms. The resulting Brooding subscale (RRS-B) contains five items rated on a scale from 1 “never” to 4 “always” and reflects the depressive rumination at the core of Nolen-Hoeksema's (1993) ruminative response styles theory (e.g., “What am I doing to deserve this?”). The RRS-B has shown good internal consistency in prior studies ($\alpha = .77$; Treynor et al., 2003). Internal consistency in the present study was good ($\alpha = .71$).
Penn State Worry Questionnaire (PSWQ). The PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) is a 16-item self-report measure that assesses trait worry as a unidimensional construct. It captures the generality, excessiveness, and uncontrollability of worry. Items are rated on a 5-point scale ranging from 1 “not at all typical of me” to 5 “very typical of me”, with higher scores indicating more pervasive and uncontrollable worry. The PSWQ has shown excellent internal reliability ($\alpha = .91$), high test-retest reliability, and has been extensively used to identify individuals with pathological levels of worry (Meyer et al., 1990). Internal consistency in the present study was good ($\alpha = .86$).

Emotion Regulation Questionnaire (ERQ). The ERQ (Gross & John, 2003) measures the habitual use of two emotion regulation strategies: cognitive reappraisal (six items) and expressive suppression (four items). Participants respond to questions about how they generally regulate their emotional experiences and expressions on a scale from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicate the greater habitual use of each ER strategy. This scale has been extensively used in the ER literature and it has shown good to very good internal consistency ($\alpha$’s for cognitive reappraisal $> .75$; $\alpha$’s for expressive suppression $> .68$; Gross & John, 2003). Internal consistency in the present study was good (cognitive reappraisal $\alpha = .83$; expressive suppression $\alpha = .83$).

Five Facet Mindfulness Questionnaire (FFMQ). The FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is a 39-item scale that measures mindfulness in five domains: observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. Items are rated on a five-point scale from 1 “never or very rarely true” to 5 “very often or always true” with higher scores
reflecting a more mindful disposition. Internal consistency for each of the facets has been adequate to good in prior research (α’s > .75; Baer et al., 2006). Internal consistency in the present study was very good (α for total score = .89; α’s for subscales > .82).

**Difficulties in Emotion Regulation Scale (DERS).** The DERS (Gratz & Roemer, 2004) is a 36-item self-report measure that assesses habitual difficulties regulating emotions in a number of dimensions. Participants are asked to indicate how often each statement applies to them and rate each item on a 5-point scale from 1 “almost never” to 5 “almost always.” The DERS provides an overall index of emotion dysregulation (total score) or as six individual subscales (i.e., nonacceptance of emotional Responses, difficulties engaging in goal directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity). For all scales, higher scores are indicative of greater emotion dysregulation. The DERS total score and the subscales have demonstrated very good internal consistency in prior research (α’s > .84; Gratz & Roemer, 2004). Internal consistencies in the present study were very good (α for total score = .93; α’s for subscales > .78).

**Cognitive and Behavioral Avoidance Scale (CBAS).** The CBAS includes 31 items assessing avoidance in four domains: behavioral-nonsocial, behavioral-social, cognitive-nonsocial, and cognitive-social avoidance (Ottenbreit & Dobson, 2004). Participants are instructed to consider what is generally true for them, and rate each item on a scale from 1 “not at all true for me” to 5 “extremely true for me.” All scales (including the total score) are scored such that higher numbers reflect greater levels of avoidance. Sample items include “I avoid attending social activities (behavioral-social)”
and “I avoid making decisions about the future (cognitive-nonsocial).” The CBAS has been shown to have adequate psychometric properties in prior research (Ottenbreit & Dobson, 2004). Internal consistency in the present study was very good for total score ($\alpha = .92$), but was more variable for the subscales ($\alpha$'s ranging from .61 to .88).

**Effortful Control Scale – Persistence/Low Distractibility Subscale (ECS-PLD).** The persistence and low distractibility subscale of the Effortful Control Scale (ECS; Lonigan 1998; Lonigan & Phillips, 2002) is a 12-item measure designed to tap the attention and activation control dimensions of effortful control. Participants are instructed to consider the extent to which each statement describes how they are *most of the time.* Items are scored on a five-point scale ranging from 1 “not at all” to 5 “very much,” and include items such as “Even little things distract me.” Although originally designed for use with children, the items are appropriate for college students and factor analyses support the use of the ECS-PLD in undergraduate samples (Vasey, 2008). The scale has good internal consistency and excellent test–retest reliability across a 7-week interval ($r = .80$; Vasey, 2008). Internal consistency in the present study was excellent ($\alpha = .89$).

**Lab Session: Experimental Paradigm**

*Session preparation.* Prior to each session, trained research assistants extracted the text-entry responses of the most intense worries and ruminations that participants described in each diary during Phase One. The research assistant copied the text entry responses into a session checklist that was personalized for each participant. Importantly, participants would be prompted to focus on these worries and ruminations during each idiographic mood induction during the lab session. Additionally, the research assistant also copied the text entry response for the location that each participant described in each
diary during Phase One. This specific question would be used for those individuals randomized to the control training condition.

**Introduction.** Participants were shown a list of their worry and rumination text entries that they described in each diary during Phase One. Participants were asked to retrospectively rate the intensity of each worry and rumination on a scale from 1 “not intense at all” to 10 “extremely intense”. Then, participants rank ordered the five worries and five ruminations based on these intensity ratings. In a similar fashion, participants were also shown a list of the locations that they visited during diary phase one. They were asked to rate how much time they spent at each of these locations on a scale from 1 “none of my time” to 10 “all of my time” and rank order them accordingly. These ranked lists were used in the subsequent portions of the study.

Afterwards, participants began the experimental task, which I programmed using the E-Prime 2.0 software (Psychology Software Tools, Pittsburgh, PA). First, participants in both conditions received a reminder of the differences between worry and rumination. These descriptions were presented in a counterbalanced order and were identical to those given in the diary entries (see Appendix B). However, examples were also given that differed from those given in the diaries (see Appendix D). The goal of providing different examples of worry and rumination was to facilitate the participants’ ability to differentiate and generalize their knowledge regarding these two constructs as they proceeded through the experiment. Participants were also given the same quiz on worry and rumination that was administered during the diary entries. As previously described, participants were required to answer all four questions on this quiz correctly before proceeding with the experiment. Although no quantitative data was collected on these
quizzes, research assistants stated that nearly all participants answered these four questions correctly, particularly because they had already completed this identical quiz during the previous diary entries.

After this block, E-Prime automatically randomized participants to either the ER training or the control training condition. Participants in the ER training condition were taught two strategies to more effectively manage their worries and ruminations: acceptance and reappraisal (see Appendix E). Those participants who were randomly assigned to the control group underwent the same procedures as the experimental group, but did not receive the specific ER training component. Rather, they were taught “location description strategies” for how to better describe a location that they visited during Phase One of the diary assessments (see Appendix F). The trainings were designed to be identical in all aspects except for the content of the training (i.e., emotions and their regulation). This process was done to control for any potential confounds of administering different trainings to each group such as the length of the training, or the use of attentional and cognitive resources (see below for additional information).

**Emotion regulation (ER) training.** To start the ER training, participants learned about acceptance and reappraisal in a didactic manner, including what these strategies involve and how they can be used to effectively regulate their emotions (see Appendix E). A description of each strategy was given that could be easily understood. After learning these two ER strategies, the participants were shown the two examples of worry and rumination that were previously presented (see Appendix F). Then, participants were asked to describe: 1) how they could accept the emotions that they were feeling related to this worry/rumination (i.e., acceptance), and 2) how they could reinterpret this
worry/rumination to feel less negative emotions (i.e., reappraisal). Participants generated two ways in which they could use each ER strategy for both examples and typed their responses into the computer. A trained research assistant verified that the participant appropriately used each strategy before they advanced. If the participant had difficulty generating his or her own examples, the research assistant provided guidance and structured examples on how these strategies could be used to manage emotions related to the specific worry or rumination example. Participants were also encouraged to ask questions to the research assistant throughout the training if they were unsure of how these strategies could be used.

Lastly, participants used one of their own worries and one of their own ruminations that they previously ranked third overall based on intensity. However, these examples were not ranked in their top two, as those were used for the subsequent induction task. Participants generated two ways in which they could use acceptance and two ways in which they could use reappraisal to regulate their worry and rumination (and associated emotions). As such, participants practiced specific ways to use these ER strategies in relation to a personally relevant worry and rumination. The research assistant again verified that these ER strategies were used correctly, which was required in order to advance to the next part of the experiment. Guidance and structured examples were given to the participant as needed. All aspects of the training were counterbalanced in order to reduce the chances of any order effects, such as the order in which participants were taught acceptance and reappraisal, the order in which they were prompted to use each strategy during the practice rounds, and the order in which the worry and rumination examples were practiced. The research assistants documented when participants had
difficulty understanding these ER strategies and generating their own examples of using these strategies. Overall, this qualitative data showed that nearly all participants were successful in understanding and using these ER strategies.

**Control training.** Participants in the control training condition learned two “location description strategies” which helped them better describe a location that they frequently visited in diary phase one. The two strategies they learned were called “proximity descriptions” and “sensory descriptions” (see Appendix F). The control training was specifically designed to be equivalent to the ER training in all aspects except for content (i.e., it was not relevant to emotions or ER). Therefore, the control training was identical to the ER training in the following domains: 1) presentation, 2) length, 3) wording and format, 4) two practice rounds using provided examples, 5) two practice rounds using personally relevant examples, and 6) guided supervision by a trained research assistant.

After being given descriptions of how “proximity descriptions” and “sensory descriptions” could be used to better describe a location, participants were presented with the following location examples: “I am currently in the psychology building on campus” and “I am currently in the library on campus.” For each example, participants were asked to generate two ways in which they could use: 1) a “proximity description,” and 2) a “sensory description” to better describe where these places are located. After the research assistant verified the correct use of these strategies, participants practiced using two of the locations that they frequently visited from their diaries in Phase One. As with the ER training, all aspects of the control training were done in a counterbalanced order in order to reduce any order effects, such as the order in which participants were taught “sensory
descriptions” and “proximity descriptions,” the order in which they were prompted to use each strategy during the practice rounds, and the order in which each of the location examples were practiced. Similar to the ER training condition, research assistants’ documentation demonstrated that nearly all participants were successful in understanding and using these “location description” strategies.

**Worry/Rumination Inductions.** After the trainings, all participants underwent the same worry and rumination induction procedures (see Appendix G). Based on their prior rankings, participants were prompted to focus on the two highest ranked worries and the two highest ranked ruminations during the inductions. The research assistant informed the participants which specific worry or rumination they would be focusing on for the induction, and they gave the participant their personalized checklist so that they could re-read their worry or rumination description.

Participants were instructed to concentrate on the prompts that they would hear through headphones while focusing on their emotions and associated experiences (e.g., physical sensations, thoughts). Each prompt began with “Think about…” and a specific statement followed that was relevant to the constructs of worry (e.g., “how bad the consequences could be if something bad happened) or rumination (e.g., “why you react the way you do”). The rumination induction prompts were adapted from Nolen-Hoeksema’s rumination induction procedures (Lyubomirsky & Nolen-Hoeksema, 1993; Susan Nolen-Hoeksema & Morrow, 1993). The worry induction prompts were designed to tap into the cardinal features of worry (e.g., anxious arousal, future-oriented perseverative cognition).
The four inductions were done in a counterbalanced order for the each of two highest ranked worries and ruminations. However, participants always focused on their second ranked worry/rumination before the first ranked worry/rumination in order to increase the intensity of the inductions as participants progressed through the study. Each induction lasted four minutes.

*Emotional Responses to Worry-Rumination Induction.* After each induction, participants had two minutes to type into a computer all of the emotions and thoughts that they experienced during the induction. This allowed participants to articulate and describe the emotions that they were currently experiencing in response to the induction. This was also used for the next block (i.e., ER task) where participants described how they could regulate their emotions associated with each worry or rumination. This portion of the experiment was identical for both conditions.

*Emotion Regulation Task.* Participants then had two minutes to type into the computer ways in which they could regulate their emotions. Importantly, the participants were not instructed to use any specific regulation strategies. Rather, participants were instructed to describe how they would “manage their feelings” that they were experiencing as a result of the induction. The wording of these instructions was framed in such a way that all participants were not primed to use any specific ER strategies. It was my hope that those in the ER training condition learned to effectively use acceptance and reappraisal, and now had these strategies in their repertoire so that they could be implemented to regulate their worries and ruminations.

Each of the four blocks lasted eight minutes (i.e., four minute induction, two minutes to type emotions into the computer, two minutes for the ER task) for a total of 32
minutes total (see Figure 1). At the end of the in-lab training, participants rated their
current emotions and symptoms, levels of worry and rumination, and their
success/difficulty regulating their emotions during the experiment. Participants were then
reminded to complete the five subsequent diary entries in Phase Two (days 6-10),
including the diary entry for that night. At the end of the study (i.e., diary Phase Two),
participants were provided with a debriefing form via email that outlined the purpose of
the study and included a list of mental health resources. Participants were then
compensated at the end of the study.

**Study Time Points and VAS Ratings**

Participants used a visual analogue scale (VAS) ranging from 0 “Not at all” to
100 “Extremely” to rate two state-level emotions (anxiety and sadness) and their state-
level use of four ER strategies (worry, rumination, acceptance, and reappraisal). These
VAS ratings were completed at the following time points: T1 = baseline, T2 = pre-
training, T3= post-training, T4 = pre-induction, T5 = post-induction, T6 = post-emotional
responses period, T7 = post-ER task.

**Data Analysis**

First, I examined the distribution and skewness of each VAS variable and the self-
report questionnaires to determine whether any variables needed to be transformed or if
there were any outliers that may need to be excluded from the analyses. Then, I
conducted *t*-tests to examine any differences between participants in the two conditions in
the following domains: 1) clinical characteristics (e.g., CSR ratings for the disorders of
interest, number of comorbid diagnoses), 2) demographic information, 3) self-report
questionnaires assessing symptoms of GAD and MDD, and the use of ER strategies (i.e.,
worry, rumination, acceptance, and reappraisal), and 4) baseline VAS ratings at the start of the experiment (T1).

Then, as a manipulation check to examine the effects of receiving the ER training, I conducted a repeated-measures MANOVA with condition (ER training, control training) and time (T2: pre-training and T3: post-training) predicting changes in state-level anxiety, sadness, worry, rumination, acceptance, and reappraisal.

To test my main hypotheses, I ran several repeated-measures MANOVAs with condition (ER training, control training) and time (T4: pre-induction, T5: post-induction, T7: post-ER task) predicting changes in state-level anxiety, sadness, worry, rumination, reappraisal, and acceptance. It should be noted that all three of these time points were entered into the MANOVA models simultaneously in order to test the most parsimonious statistical model relevant to my main hypotheses.

To test hypothesis #1, I focused on the following two time points: pre-induction (T4) and post-induction (T5). Specifically, I tested the two-way interaction between time and condition to examine whether, during the first overall induction, participants in the ER training condition reported: 1) lower state-level anxiety and sadness, 2) lower state-level use of worry and rumination, and 3) greater state-level use of acceptance and reappraisal.

To test hypothesis #2, I focused on the following two time points: post-induction (T5) and post-ER task (T7). Specifically, I tested the two-way interaction between time and condition to examine whether, during the ER task following the first overall induction, participants in the ER training condition reported: 1) lower state-level anxiety
and sadness, 2) lower state-level use of worry and rumination, and 3) greater state-level use of acceptance and reappraisal.

To test my exploratory hypothesis of whether there were functional differences between inducing worry versus rumination, I added induction type (i.e., worry or rumination) to the MANOVA models and ran models as described above.
Chapter 3: Results

Recruitment

A total of 136 participants opened the link to the Qualtrics survey. Eight of them (5.9%) declined providing informed consent after opening the Qualtrics link to enroll in the study, 53 (39%) discontinued their participation (e.g., did not complete a sufficient number of diary entries, cancelled their scheduled lab session) and were never brought into the lab session, three (2.2%) were excluded based on psychiatric information they provided in their initial diary entry (e.g., having a diagnosis of bipolar disorder), and 13 (9.6%) were run as pilot data before the SCID-I administration was added to the research protocol. Thus, a total of 59 participants came into the lab and completed the SCID-I.

Sixteen participants (11.8%) were excluded based on information provided in the SCID-I assessment. A total of five participants reported moderate to severe current suicidal ideation/behaviors (e.g., a current suicide plan, past suicide attempts) or current non-suicidal self-injury (NSSI; e.g., cutting). Given this information, we determined that it was not advisable for these individuals to participate in the experiment, as the benefits for having them receive a negative mood induction likely did not outweigh the potential risks involved. A total of four participants met diagnostic criteria for exclusionary disorders. That is, two participants endorsed current symptoms of psychosis (e.g., hallucinations or delusions), one participant was previously diagnosed with borderline personality disorder and had a history of suicide attempts and NSSI, and one participant
was diagnosed with bipolar disorder. A total of seven participants did not meet diagnostic criteria for the disorders of interest in this study. Two of these participants endorsed symptoms of current MDD, but we determined that their depressive symptoms were better accounted for by their trauma history, and thus, they were given PTSD as their primary diagnosis. Five of these participants did not meet current diagnostic criteria for either GAD or MDD.

Finally, one participant (0.7%) did not speak English as a native language, and one participant (0.7%) was excluded from the analyses because he had conceptual trouble understanding the ER strategies taught during the ER training. As such, the final analyses included a total of 41 participants (See Figure 2 for study flow diagram).

**Sample: Demographics**

Participants (N = 41) were between the ages of 18 and 28 years old (M = 20.00, SD = 2.60) and included undergraduates who signed up via the REP (n = 19) as well as members of the general community (n = 22). In terms of gender, 78% of the sample identified as female (n = 32), 17.1% as male (n = 7), and 4.9% as “other” (n = 2). In terms of race and ethnicity, 80.5% of participants identified as White (7.3% Asian, 4.9% Black, 4.9% Native American, and 7.3% other) and 7.3% of participants identified as Hispanic/Latino.

**Sample: Clinical Characteristics**

At consensus diagnosis meetings, the interviewer, supervising clinical psychologist, and graduate students each provided a self-determined CSR. In order for a diagnosis to be given, there must have been complete agreement with respect to the

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1 Percentages do not add up to exactly 100% given that participants were allowed to select more than one race or ethnicity that they self-identify with.
diagnoses, and agreement on the CSR rating within one point. CSR discrepancies that differed by more than one point were discussed further in order to reach a consensus agreement. In order to statistically test agreement among diagnostic raters (i.e., inter-rater reliability), I calculated the intraclass correlation coefficient (ICC), which is often used to assess by consistency of quantitative measurements made by two or more different raters, particularly using Likert-type scales like the CSR (Müller & Büttner, 1994; Norman, 2010; Shrout & Fleiss, 1979). Specifically, I calculated the average ICC measure, which is an index for the reliability of two or more raters averaged together. The average measure ICC’s were as follows: .938, 95% CI [.88, .973] for GAD CSR ratings, and .944, 95% CI [.871, .982] for MDD CSR ratings. For all other disorders, average measure ICC’s ranged from .878 to .968. Overall, this suggests that there was excellent agreement among the raters when assigning a diagnostic CSR for each participant.

A majority of participants in the current study were diagnosed with either GAD or comorbid GAD+MDD. Specifically, 53.66% of participants (n = 22) were diagnosed with GAD alone, 39.02% of participants (n = 16) were diagnosed with comorbid GAD+MDD, and 4.88% of participants were diagnosed with either MDD or dysthymia alone (n = 2). Finally, one participant (2.44%) reported having excessive worries and physical symptoms associated with her anxiety, but only endorsed a low-level of clinically significant impairment and interference. This participant also reported experiencing major depressive episodes in the past. As such, this participant was diagnosed with subthreshold GAD and received a GAD CSR of 3 given the lower level of functional impairment that she reported, and we elected to include these data in these
analyses. Those participants diagnosed with GAD had a mean CSR of 5.21 (SD = .86), those diagnosed with MDD had a mean CSR of 5.06 (SD = .90), and those diagnosed with dysthymia had a mean CSR of 4.40 (SD = .55) (See Table 1 for diagnostic information and CSR ratings).

Moreover, comorbidity in this sample was high, as participants were also diagnosed with: social anxiety disorder (n = 12, 29.3%), a specific phobia (n = 10, 24.4%), panic disorder (n = 4, 9.8%), agoraphobia (n = 4, 9.8%), obsessive-compulsive disorder (OCD; n = 2, 4.9%), posttraumatic stress disorder (PTSD; n = 2, 4.9%), body dysmorphic disorder (n = 1, 2.4%), eating disorder-not otherwise specified (n = 1, 2.4%), excoriation (skin picking) disorder (n = 5, 12.2%), illness anxiety disorder (i.e., hypochondriasis; n = 2, 4.9%), trichotillomania (n = 1, 2.4%), and MDD in partial remission (n = 1, 2.4%). Additionally, many participants met diagnostic criteria for a past major depressive episode (n = 14, 34.15%). Independent samples t-tests revealed that there were no significant differences in the number of comorbid disorders between participants in the ER training and control condition, p > .334 (see Table 1).

Eight participants (19.51%) reported that they were currently taking psychotropic medications. Six participants reported taking a selective serotonin reuptake inhibitor (e.g., Sertraline, Fluoxetine, Escitalopram) for depression and/or anxiety, one participant reported taking a selective norepinephrine reuptake inhibitor (Strattera) for ADHD, and one participant reported taking a stimulant (Adderall) for a sleep disorder.

**Clinical Characteristics: t-tests**

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2 I ran the analyses with and without this participant included in the sample. The results did not change.
In order to examine whether the ER training and control conditions differed in clinical severity for the disorders of interest in the present study, I conducted independent samples t-tests on the CSR ratings for those diagnosed with GAD, MDD, and also dysthymia. There were no significant group differences, p’s > .180.

**Descriptive Statistics**

I first examined the distribution and skewness of each VAS variable and the self-report questionnaires. Given that all of the skewness ratios were less than two, I did not transform any variables. Next, I examined boxplots for each of the variables in order to identify any outliers. To identify outliers in the data (e.g., participants with consistently skewed responses or participants who appeared to answer questions in a random fashion), I used the following criteria: participants had to have 1) a score two or three standard deviations above or below the mean; and 2) an outlier on more than one measure. Given that I did not find any patterns of outliers in these data, I did not exclude any outliers from the analyses.

**Demographic Information: t-tests**

I found no significant differences between the ER training and control conditions on demographic variables (i.e., age, gender, race/ethnicity), p’s > .162 (see Table 2).

**Self-Report Questionnaires: t-tests**

I conducted independent samples t-tests to examine if there were any significant differences between the ER training and control conditions on the self-report questionnaires (see Table 3). There were no significant differences (p’s > 0.16), with the exception that the control condition had a significantly lower total score on the GADQ with the six-month duration skip-out question, t(38) = -2.17, p = .036, 95% CI [-3.91,
1.13], mean difference = -2.17. Additionally, the control condition had a marginally higher score on the RRS Brooding subscale, \( t(38) = 1.927, p = .062, 95\% CI [-.09, 3.65] \), mean difference = 1.78.

**Baseline VAS Ratings: \( t \)-tests**

Independent samples \( t \)-tests revealed that there were no significant differences between the ER training and control conditions on the baseline VAS ratings (i.e., anxiety, sadness, worry, rumination, acceptance, and reappraisal) at the beginning of the experimental paradigm (T1), \( p \)'s > .420 (see Table 4).

**Manipulation Check of the ER training**

To evaluate the effects of receiving the ER training, I ran several repeated-measures MANOVAs with condition (ER training, control training) and (T2: pre-training and T3: post-training) predicting changes in state-level anxiety, sadness, worry, rumination, acceptance, and reappraisal. In particular, these analyses primarily sought to examine whether participants in the ER training condition demonstrated increases in state-level acceptance and reappraisal as a function of practicing using these specific strategies during the ER training.

**Anxiety.** There was no significant main effect of time, \( F(1, 39) = 1.518, p = .225, \) partial \( \eta^2 = .037 \), condition, \( F(1, 39) = .027, p = .871, \) partial \( \eta^2 = .001 \), or interaction between condition and time, \( F(1, 39) = 1.518, p = .225, \) partial \( \eta^2 = .037 \).

**Sadness.** There was a marginally significant main effect of time, \( F(1, 39) = 3.318, p = .076, \) partial \( \eta^2 = .078 \). Post-hoc analyses revealed that participants reported marginally less sadness from pre-training (T2: \( M = 24.44, SE = 3.98 \)) to post-training (T3: \( M = 19.77, SE = 3.42 \)), \( p = .076, 95\% CI [-9.85, .515] \). There was no significant
main effect of condition, $F(1, 39) = .659, p = .422$, partial $\eta^2 = .017$, or interaction between condition and time, $F(1, 39) = .333, p = .567$, partial $\eta^2 = .008$.

**Worry.** There was a significant main effect of time, $F(1, 39) = 5.455, p = .025$, partial $\eta^2 = .123$. Post-hoc analyses revealed that participants reported significantly less worry from pre-training (T2: $M = 43.68, SE = 4.30$) to post-training (T3: $M = 38.20, SE = 4.19$), $p = .025$, 95% CI [-10.23, -.735]. There was no significant main effect of condition, $F(1, 39) = .000, p = .997$, partial $\eta^2 = .000$, or interaction between condition and time, $F(1, 39) = .567, p = .456$, partial $\eta^2 = .014$.

**Rumination.** There was no significant main effect of time, $F(1, 39) = .292, p = .592$, partial $\eta^2 = .007$, condition, $F(1, 39) = 1.784, p = .189$, partial $\eta^2 = .004$, or interaction between condition and time, $F(1, 39) = 1.692, p = .201$, partial $\eta^2 = .042$.

**Acceptance.** There was no significant main effect of time, $F(1, 39) = 2.776, p = .104$, partial $\eta^2 = .066$, condition, $F(1, 39) = .459, p = .502$, partial $\eta^2 = .012$, or interaction between condition and time, $F(1, 39) = .093, p = .763$, partial $\eta^2 = .002$.

**Reappraisal.** There was a significant main effect of time, $F(1, 39) = 12.363, p = .001$, partial $\eta^2 = .241$. There was no significant main effect of condition, $F(1, 39) = 1.137, p = .293$, partial $\eta^2 = .028$. Notably, there was a significant interaction between condition and time, $F(1, 39) = 19.292, p < .001$, partial $\eta^2 = .331$. Post-hoc analyses revealed that participants in the ER training condition reported a significant increase in the use of reappraisal from the pre-training (T2) to post-training (T3) time point, $F(1, 39) = 32.053, p < .001$, partial $\eta^2 = .451$, mean difference = 20.762. However, those in the control condition did not report any significant changes, $F(1, 39) = .375, p = .544$, partial $\eta^2 = .010$. Moreover, participants in the ER training condition reported significantly
greater use of reappraisal at the post-training time point (T3) compared to participants in the control condition, $F(1, 39) = 5.730, p = .022$, partial $\eta^2 = .128$. See Table 5 for means and standard deviations at the pre-training (T2) and post-training (T3) time points.

**Hypothesis #1: Effects of the ER Training on the First Worry or Rumination Induction**

I ran several repeated-measures MANOVAs with condition (ER training, control training) and time (T4: pre-induction, T5: post-induction, T7: post-ER task) predicting changes in state-level anxiety, sadness, worry, rumination, acceptance, and reappraisal. Specifically, to test hypothesis #1, I focused on the pre- and post-induction time points in this model. See Table 6 for means and standard deviations of the VAS ratings at these three time points.

**Anxiety.** There was a significant main effect of time, $F(2, 38) = 5.412, p = .009$, partial $\eta^2 = .222$, such that participants reported a significant increase in state anxiety from pre-induction (T4: $M = 36.49, SE = 3.84$) to post-induction (T5: $M = 43.91, SE = 4.15$), $p = .017$, 95% CI [1.09, 13.74]. There was no significant main effect of condition, $F(1, 39) = .024, p = .878$, partial $\eta^2 = .001$, nor interaction between condition and time, $F(2, 38) = .222, p = .802$, partial $\eta^2 = .012$.

**Sadness.** There was a significant main effect of time, $F(2, 38) = 16.31, p < .001$, partial $\eta^2 = 462$, such that participants reported a significant increase in state sadness from pre-induction (T4: $M = 19.85, SE = 3.46$) to post-induction (T5: $M = 35.13, SE = 3.69$), $p < .001$, 95% CI [8.67, 21.90]. There was no significant main effect of condition, $F(1, 39) = .223, p = .639$, partial $\eta^2 = .006$, nor interaction between condition and time, $F(2, 38) = .880, p = .423$, partial $\eta^2 = .044$. 

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**Worry.** There was no significant main effect of time, $F(2, 38) = 1.797, p = .18$, partial $\eta^2 = .086$, condition, $F(1, 39) = .189, p = .666$, partial $\eta^2 = .005$, nor interaction between condition and time, $F(2, 38) = 2.079, p = .139$, partial $\eta^2 = .099$.

**Rumination.** There was a significant main effect of time, $F(2, 38) = 16.367, p < .001$, partial $\eta^2 = .463$, such that participants reported a significant increase in state rumination from pre-induction (T4: $M = 20.26$, $SE = 3.22$) to post-induction (T5: $M = 40.36$, $SE = 3.99$), $p < .001$, 95% CI [10.85, 29.39]. There was no significant main effect of condition, $F(1, 39) = 1.267, p = .267$, partial $\eta^2 = .031$, nor interaction between condition and time, $F(2, 38) = .447, p = .643$, partial $\eta^2 = .023$.

**Acceptance.** There was a significant main effect of time, $F(2, 38) = 6.684, p = .003$, partial $\eta^2 = .260$, such that participants reported a marginally significant decrease in state acceptance from pre-induction (T4: $M = 59.93$, $SE = 4.15$) to post-induction (T5: $M = 53.90$, $SE = 4.12$), $p = .055$, 95% CI [-12.15, .102]. There was no significant main effect of condition, $F(1, 39) = .639, p = .429$, partial $\eta^2 = .016$, nor interaction between condition and time, $F(2, 38) = .345, p = .710$, partial $\eta^2 = .018$.

**Reappraisal.** Given that the ER training condition reported significantly greater state-level reappraisal at the post-training time point (T3) right before the beginning of the mood inductions ($p = .022$), I also included this time point (T3) to this MANOVA model to control for any differences between conditions prior to the first induction. There was a significant main effect of time, $F(3, 37) = 5.928, p = .002$, partial $\eta^2 = 325$, however, post-hoc analyses revealed that there were no significant changes in state reappraisal from pre-induction (T4: $M = 35.11$, $SE = 3.65$) to post-induction (T5: $M = 40.78$, $SE = 4.20$), $p = 1.00$, 95% CI [-17.29, 5.97]. There was a significant main effect of
condition, $F(1, 39) = 4.621, p = .038$, partial $\eta^2 = .106$, such that participants in the ER condition reported significantly higher mean levels of state reappraisal ($M = 47.96, SE = 4.67$) compared to participants in the control condition ($M = 33.59, SE = 4.79$), $p = .038$, 95% CI [.85, 27.90]. There was no significant interaction between condition and time, $F(3, 37) = .434, p = .730$, partial $\eta^2 = .034$.

**Hypothesis #2: Effects of the ER Training on the ER Task**

I ran several repeated-measures MANOVAs with condition (ER training, control training) and time (T4: pre-induction, T5: post-induction, T7: post-ER task) predicting changes in state-level anxiety, sadness, worry, rumination, acceptance, and reappraisal. Specifically, to test hypothesis #2, I focused on the post-induction and post-ER task time points in this model. See Table 6 for means and standard deviations of the VAS ratings at these three time points.

**Anxiety.** There was a significant main effect of time, $F(2, 38) = 5.412, p = .009$, partial $\eta^2 = .222$, such that participants reported a significant decrease in state anxiety from post-induction ($T5: M = 43.91, SE = 4.15$) to post-ER task ($T7: M = 37.60, SE = 4.11$), $p = .018$, 95% CI [-11.75, -.87]. There was no significant main effect of condition, $F(1, 39) = .024, p = .878$, partial $\eta^2 = .001$, nor interaction between condition and time, $F(2, 38) = .222, p = .802$, partial $\eta^2 = .012$.

**Sadness.** There was a significant main effect of time, $F(2, 38) = 16.31, p < .001$, partial $\eta^2 = 462$, such that participants reported a significant decrease in state sadness from post-induction ($T5: M = 35.13, SE = 3.69$) to post-ER task ($T7: M = 26.52, SE = 3.43$), $p = .001$, 95% CI [-13.92, -.330]. There was no significant main effect of
condition, $F(1, 39) = .223, p = .639$, partial $\eta^2 = .006$, nor interaction between condition and time, $F(2, 38) = .880, p = .423$, partial $\eta^2 = .044$.

**Worry.** There was no significant main effect of time, $F(2, 38) = 1.797, p = .18$, partial $\eta^2 = .086$, condition, $F(1, 39) = .189, p = .666$, partial $\eta^2 = .005$, nor interaction between condition and time, $F(2, 38) = 2.079, p = .139$, partial $\eta^2 = .099$.

**Rumination.** There was a significant main effect of time, $F(2, 38) = 16.367, p < .001$, partial $\eta^2 = .463$. However, post-hoc analyses revealed that this main effect was only significant from pre-induction (T4) to post-induction (T5), yet there were no significant changes in state rumination from post-induction (T5: $M = 40.36, SE = 3.99$) to post-ER task (T7: $M = 35.15, SE = 3.83$), $p = .284$, 95% CI [-12.82, 2.40]. There was no significant main effect of condition, $F(1, 39) = 1.267, p = .267$, partial $\eta^2 = .031$, nor interaction between condition and time, $F(2, 38) = .447, p = .643$, partial $\eta^2 = .023$.

**Acceptance.** There was a significant main effect of time, $F(2, 38) = 6.684, p = .003$, partial $\eta^2 = .260$, such that participants reported significant increases in state acceptance from post-induction (T5: $M = 53.90, SE = 4.12$) to post-ER task (T7: $M = 62.17, SE = 3.66$), $p = .004$, 95% CI [2.34, 14.20]. There was no significant main effect of condition, $F(1, 39) = .639, p = .429$, partial $\eta^2 = .016$, nor interaction between condition and time, $F(2, 38) = .345, p = .710$, partial $\eta^2 = .018$.

**Reappraisal.** Given that the ER training condition reported significantly greater state-level reappraisal at the post-training time point (T3) right before the beginning of the mood inductions ($p = .022$), I also included this time point (T3) to this MANOVA model to control for any differences between conditions prior to the first induction. There was a significant main effect of time, $F(3, 37) = 5.928, p = .002$, partial $\eta^2 = .325$, such
that participants reported a marginally significant increase in state reappraisal from post-induction (T5: $M = 40.78$, $SE = 4.20$) to post-ER task (T7: $M = 49.51$, $SE = 4.43$), $p = .099$, 95% CI [-.957, 18.43]. There was a significant main effect of condition, $F(1, 39) = 4.621$, $p = .038$, partial $\eta^2 = .106$, such that participants in the ER condition reported significantly higher mean levels of state reappraisal ($M = 47.96$, $SE = 4.67$) compared to participants in the control condition ($M = 33.59$, $SE = 4.79$), $p = .038$, 95% CI [.85, 27.90]. There was no significant interaction between condition and time, $F(3, 37) = .434$, $p = .730$, partial $\eta^2 = .034$.

**Exploratory Hypothesis: Differential Effects of the Worry Versus Rumination Inductions**

To test exploratory hypothesis #3, I ran several repeated-measures MANOVAs with condition (ER training, control training) and induction type (worry or rumination) predicting changes in state-level anxiety, sadness, worry, rumination, reappraisal, and acceptance at three time points (T4: pre-induction, T5: post-induction, T7: post-ER task). See Table 7 for means and standard deviations of the VAS ratings at these three time points broken down by induction type.

**Anxiety.** The two-way interaction between time and condition was not significant, $F(2, 36) = .224$, $p = .80$, partial $\eta^2 = .012$. There was a marginally significant two-way interaction between time and induction type, $F(2, 36) = 2.692$, $p = .081$, partial $\eta^2 = .130$. Probing this interaction (see Figure 3) revealed that participants who received a worry induction first reported a significant increase in state anxiety from pre-induction (T4: $M = 40.58$, $SE = 5.28$) to post-induction (T5: $M = 50.28$, $SE = 5.46$), $p = .022$, 95% CI [1.15, 18.25]. However, these participants did not report any significant changes in state anxiety
from post-induction (T5) to post-ER task (T7: $M = 46.58$, $SE = 5.34$), $p = .593$, 95% CI [-10.74, 3.36]. Participants who received a rumination induction first reported no significant changes in state anxiety from pre-induction (T4: $M = 31.16$, $SE = 5.72$) to post-induction (T5: $M = 34.94$, $SE = 5.92$), $p = .941$, 95% CI [-5.49, 13.05]. However, these participants did report a significant decrease in state anxiety from post-induction (T5) to post-ER task (T7: $M = 26.86$, $SE = 5.80$), $p = .036$, 95% CI [-15.73, -.415].

Moreover, at the post-induction time point (T5), those participants who received a worry induction reported marginally greater state anxiety than those who received a rumination induction, $F(1, 37) = 3.629$, $p = .065$, partial $\eta^2 = .089$, mean difference = 15.337. At the post-ER task time point (T7), those participants who received a worry induction reported significantly greater state anxiety than those who received a rumination induction, $F(1, 37) = 6.255$, $p = .017$, partial $\eta^2 = .145$, mean difference = 19.720.

The three-way interaction between condition, induction type, and time was marginally significant, $F(2, 36) = 2.613$, $p = .087$, partial $\eta^2 = .127$. Probing this interaction revealed that for participants who received a worry induction first, those in the control condition reported a significant increase in state anxiety from pre-induction (T4: $M = 42.25$, $SE = 7.11$) to post-induction (T5: $M = 54.75$, $SE = 7.36$), $p = .030$, 95% CI [.975, 24.03], whereas those in the ER training condition did not report any significant changes in state anxiety from pre-induction (T4: $M = 38.90$, $SE = 7.79$) to post-induction (T5: $M = 45.80$, $SE = 8.06$), $p = .536$, 95% CI [-5.72, 19.52]. For a graphical depiction of this three-way interaction, see Figure 4 for the control condition and Figure 5 for the ER training condition.
Moreover, probing this interaction revealed that for participants who received a rumination induction first, those in the ER training condition reported a significant decrease in state anxiety from post-induction (T5: \(M = 42.00, SE = 7.68\)) to post-ER task (T7: \(M = 27.73, SE = 7.53\)), \(p = .003, 95\% \text{ CI} [-24.21, -4.33]\), whereas those in the control condition did not report any significant changes in state anxiety from post-induction (T5: \(M = 27.88, SE = 9.01\)) to post-ER task (T7: \(M = 26.00, SE = 8.82\)), \(p = 1.00, 95\% \text{ CI} [-13.53, 9.78]\).

**Sadness.** The two-way interaction between time and condition was not significant, \(F(2, 36) = 1.494, p = .238, \text{ partial } \eta^2 = .077\). There was a significant two-way interaction between time and induction type, \(F(2, 36) = 4.198, p = .023, \text{ partial } \eta^2 = .189\). Probing this interaction (see Figure 6) revealed that participants who received a worry induction first reported a significant increase in state sadness from pre-induction (T4: \(M = 20.27, SE = 4.86\)) to post-induction (T5: \(M = 28.73, SE = 4.96\)), \(p = .046, 95\% \text{ CI} [.11, 16.81]\). However, these participants did not report any significant changes in state sadness from post-induction (T5) to post-ER task (T7: \(M = 23.76, SE = 4.71\)), \(p = .240, 95\% \text{ CI} [-11.88, 1.95]\). Participants who received a rumination induction first reported a significant increase in state sadness from pre-induction (T4: \(M = 19.68, SE = 5.28\)) to post-induction (T5: \(M = 42.51, SE = 5.39\)), \(p < .001, 95\% \text{ CI} [.11, 16.81]\). These participants also reported a significant decrease in state sadness from post-induction (T5) to post-ER task (T7: \(M = 30.62, SE = 5.11\)), \(p = .001, 95\% \text{ CI} [-19.39, -4.37]\).

The three-way interaction between condition, induction type, and time was not significant, \(F(2, 36) = 2.613, p = .180, \text{ partial } \eta^2 = .091\).
**Worry.** The two-way interaction between time and condition type was not significant, $F(2, 36) = 1.831, p = .175$, partial $\eta^2 = .092$. The two-way interaction between time and induction type was not significant, $F(2, 36) = .958, p = .393$, partial $\eta^2 = .051$. The three-way interaction between condition, induction type, and time was also not significant, $F(2, 36) = .775, p = .468$, partial $\eta^2 = .041$.

**Rumination.** The two-way interaction between time and condition was not significant, $F(2, 36) = .513, p = .603$, partial $\eta^2 = .028$. The two-way interaction between time and induction type was significant, $F(2, 36) = 8.823, p = .001$, partial $\eta^2 = .329$. Probing this interaction (see Figure 7) revealed that participants who received a worry induction first reported no significant changes in state rumination from pre-induction (T4: $M = 22.47, SE = 4.50$) to post-induction (T5: $M = 30.21, SE = 5.02$), $p = .237$, 95% CI [-3.00, 18.49]. These participants also did not report any significant changes in state rumination from post-induction (T5) to post-ER task (T7: $M = 31.65, SE = 5.32$), $p = 1.00$, 95% CI [-8.48, 11.36]. Participants who received a rumination induction first reported a significant increase in state rumination from pre-induction (T4: $M = 17.98, SE = 4.88$) to post-induction (T5: $M = 52.58, SE = 5.45$), $p < .001$, 95% CI [22.94, 46.26]. These participants also reported a significant decrease in state rumination from post-induction (T5) to post-ER task (T7: $M = 39.39, SE = 5.77$), $p = .012$, 95% CI [-23.96, -2.42]. Moreover, at the post-induction time point (T5), those participants who received the rumination induction first reported significantly greater state rumination than those who received the worry induction first, $F(1, 37) = 9.128, p = .005$, partial $\eta^2 = .198$, mean difference = 22.371.
The three-way interaction between condition, induction type, and time was not significant, $F(2, 36) = .042, p = .959$, partial $\eta^2 = .002$.

**Acceptance.** The two-way interaction between time and condition was not significant, $F(2, 36) = .331, p = .735$, partial $\eta^2 = .017$. The two-way interaction between time and induction type was not significant, $F(2, 36) = .081, p = .922$, partial $\eta^2 = .005$. The three-way interaction between condition, induction type, and time was also not significant, $F(2, 36) = 1.772, p = .184$, partial $\eta^2 = .09$.

**Reappraisal.** Given that the ER training condition reported significantly greater state-level reappraisal at the post-training time point (T3) right before the beginning of the mood inductions ($p = .022$), I also included this time point to the model to control for any baseline differences between conditions. The two-way interaction between time and condition was not significant, $F(3, 35) = .599, p = .620$, partial $\eta^2 = .049$. The two-way interaction between time and induction type was not significant, $F(3, 35) = .446, p = .721$, partial $\eta^2 = .037$. The three-way interaction between condition, induction type, and time was also not significant, $F(3, 35) = 1.322, p = .283$, partial $\eta^2 = .102$. 

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Chapter 4: Discussion

In this thesis, I developed and tested a brief ER training that taught people diagnosed with GAD and/or MDD to use two adaptive ER strategies (i.e., acceptance and reappraisal) to regulate their use of maladaptive ER strategies (i.e., worry and rumination) and experience of negative affect (i.e., anxiety and sadness). Contrary to my predictions, my main hypotheses were not supported, as those participants in the ER training condition exhibited similar emotional responses during the worry or rumination induction as those in the control condition, despite being trained to use acceptance and reappraisal to manage their worries and ruminations. Moreover, during the subsequent ER task, all participants (irrespective of condition) reported significant decreases in anxiety and sadness from post-induction to post-ER task, as well as significant increases in acceptance and marginally significant increases in reappraisal. On the contrary, participants did not demonstrate the same success in reducing their use of worry and rumination during the ER task, which could shed light on how difficult it may be for people with GAD and/or MDD to break away from these forms of repetitive negative thinking. Finally, there was support for my secondary hypotheses, which demonstrated that the distinct worry and rumination inductions had differential effects on anxiety, sadness, and the state-level use of these strategies. Overall, this laboratory-based experimental study provided an initial step towards understanding the mechanisms by which acceptance and reappraisal may affect the use of worry and rumination, and the
experience of anxiety and sadness in GAD and MDD, particularly by adopting an ER framework to understand these processes.

**Effects of the Worry or Rumination Induction**

One of the main purposes of this thesis was to examine the impact of a brief ER training on the experience of negative affect (i.e., anxiety and sadness) and use of maladaptive ER strategies (i.e., worry and rumination) as people diagnosed with GAD and/or MDD underwent a worry or rumination induction. Participants in the ER training condition were trained to use acceptance and reappraisal in a didactic manner. Additionally, they practiced using these strategies to modulate specific worry and rumination examples that were provided to them, as well as personally relevant ones that they described during diary Phase One. As such, I expected these participants to be buffered against increases in anxiety and sadness, as well as worry and rumination, as they received the induction. However, this was not the case, as all participants reported a significant decrease in acceptance (but not reappraisal), and also significant increases in anxiety, sadness, and rumination (but not worry) from pre- to post-induction. There are a few possible reasons why this main hypothesis was not supported.

The manipulation check of the training time period (which occurred immediately prior to the first overall induction) revealed that those participants in the ER training condition did not report any significant increases in acceptance from the pre- to post-training time point. This is surprising, given that they were just trained to use this strategy, practiced implementing it, and even received corrective feedback from a trained research assistant. On the other hand, these participants did report significant increases in reappraisal from the pre- to post-training time point, whereas those in the control
condition did not. This suggests that the ER training was successful in increasing the use of reappraisal as participants learned this strategy and generated their own reappraisals during the practice period. These results could indicate that the ER training was less effective in teaching these participants acceptance as an ER strategy relative to reappraisal. As such, this gap in the training may have precluded acceptance from being translated to an ER strategy that could be effectively used during the induction period in order to provide such a buffer effect against negative affect and the use of worry and rumination. Overall, this is in line with research suggesting that some individuals frequently have difficulties learning mindfulness techniques and concepts, of which non-judgmental acceptance is a key part (e.g., Brewer, Davis, & Goldstein, 2013; Whitfield-Gabrieli et al., 2011). Moreover, people with GAD and MDD exhibit deficits in acceptance and mindfulness, which is a skill that is being increasingly incorporated into psychological interventions for anxiety and depression (Hofmann, Sawyer, Witt, & Oh, 2010; Roemer et al., 2009; Teasdale et al., 2000). To improve upon the training of acceptance, the present study could have incorporated an interactive mindfulness exercise during the ER training in order to foster participants learning acceptance as an ER strategy (see Roemer & Orsillo, 2014 for a list of mindfulness exercises frequently used in an acceptance-based treatment for GAD). As such, future research should be dedicated to understanding how acceptance skills can be optimally enhanced in those with GAD and/or MDD.

In terms of the induction, another interesting finding pertaining to acceptance was that all participants reported significant decreases in state-level acceptance from pre- to post-induction. This indicates that as participants underwent a worry/rumination
induction, they appeared to experience a reduced capacity to accept their emotional experiences. This is noteworthy especially for participants in the ER training condition given that they were explicitly trained to use this specific ER strategy. From a methodological standpoint, we only assessed acceptance by asking participants, “To what extent are you accepting your emotions right now?” which may not be the most robust method for measuring the use of acceptance. This is crucial given that there are multiple constructs associated with acceptance, such as present moment awareness, being able to observe and describe emotional experiences, mindfulness, and being non-judgmental (e.g., Baer, 2010; Baer et al., 2006; Gratz & Roemer, 2004; Hayes, 2002). Along these lines, the field should continue to move towards assessing ER strategies in more sophisticated ways in experimental studies (see Sheppes et al., 2014 for a novel approach) rather than solely relying on self-report measures (e.g., visual analogue scales), specifically to understand acceptance as a key construct in the context of GAD and MDD.

From a conceptual standpoint, this is largely in consistent with the body of literature demonstrating that people with GAD and/or MDD often display a key facet of emotion dysregulation as they begin to experience negative affect (as they did during the worry/rumination induction) – the nonacceptance of emotional responses (e.g., Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013; Ehring, Fischer, Schnülle, Bösterling, & Tuschen-Caffier, 2008; Plate et al., 2016; Roemer et al., 2009; Salters-Pedneault et al., 2006; Zlomke & Hahn, 2010). Nonacceptance reflects a tendency to have negative secondary emotional responses (e.g., guilt, shame, embarrassment) in reaction to one’s primary emotional response (e.g., anxiety, sadness), or an inability to
accept one’s reactions to distress (Gratz & Roemer, 2004). Although emotional nonacceptance was not directly assessed in the present study, it is possible that as participants began to worry or ruminate during the induction, they had difficulty accepting their distressing emotions (i.e., anxiety and sadness) or even their use of worry or rumination as an ER strategy. Consequently, this could have been one mechanism that led to a reduction in state-level acceptance during the induction.

In terms of state-level reappraisal, participants did not report any significant changes in the use of this strategy from pre- to post-induction. However, there was a significant main effect of condition, such that participants in the ER training condition reported using significantly higher mean levels of reappraisal across all time points during the first induction block relative to their control counterparts. This suggests that, despite using one adaptive ER strategy (i.e., reappraisal), participants in the ER training condition were not protected against the negative emotional effects of the worry/rumination induction. There could be a few different explanations for this finding. First, post-hoc analyses from the manipulation check of the ER training period demonstrated that participants in the ER training condition reported significantly higher levels of reappraisal at the post-training time point than those in the control condition. In other words, participants in the ER training condition were already using high levels of reappraisal right before they began the first overall induction. Perhaps their higher levels of reappraisal may have been beneficial during the training period as they practiced managing their worries and ruminative thoughts, but not sufficiently effective as the worry/rumination induction began and participants experienced a greater shift towards negative affect and distress. Second, there were no significant changes in state-level use
of reappraisal (i.e., its use remained stable) during the worry/rumination induction, which is contrary to the declining use of acceptance during the induction. Thus, reappraisal may have been an easier ER strategy for participants to learn, or the ER training may have had clearer instructions that were easier to comprehend. In turn, the worry or rumination induction may have had less of an impact on the state-level use of reappraisal for participants who underwent the ER training. Third, it could be the case that the use of reappraisal may have had some valuable effect given that participants in the ER training condition exhibited stable levels throughout the induction, but perhaps the worry or rumination inductions were too affect-laden such that their effects overshadowed the possible benefits of using reappraisal. Although these are plausible explanations, it remains to be determined why the greater use of reappraisal throughout the first induction block did not have any beneficial effect on the experience of negative affect or the use of worry and rumination for those who were trained to use this strategy.

Although the benefits of reappraisal as an ER strategy are well documented (see meta-analyses by Aldao et al., 2010; Webb, Miles, & Sheeran, 2012), there is also a growing line of research suggesting that examining the interactions between ER strategies (rather than single strategies in isolation from each other) might be a more robust method for understanding their effects. For example, I recently found that, in participants diagnosed with GAD, the relationship between reappraisal and disability and comorbid depression symptoms was moderated by levels of emotional nonacceptance (Plate et al., 2016). Specifically, reappraisal was negatively associated with these indices of functional impairment, only when participants reported engaging in low levels of emotional nonacceptance. However, this relationship was non-significant when the use of
nonacceptance was average or high. In other words, when people with GAD and co-occurring depression symptoms use the dysfunctional ER strategy of emotional nonacceptance habitually, it might actually interfere with the adaptive benefits typically associated with cognitive reappraisal. Therefore, a promising area for future research lies in investigating the interactive nature of various ER strategies such as acceptance and reappraisal, such as how the extent to which people use one of these strategies might serve as a contextual factor when seeking to understand the relationship between another strategy and mental health.

Overall, the findings from this thesis suggest that the ER training used in the present study may have several limitations that can be improved upon. The ER training used in this study may have been too brief, insufficient in didactic content, or did not provide an adequate opportunity for learning and skills generalization to occur. Indeed, the ER training portion of the experiment only lasted approximately 10 minutes, which may not have been sufficient time for participants to acquire the ability to learn these strategies and effectively use them during the worry/rumination induction. In turn, the ER training may not have been powerful enough to counteract the negative effects associated with having participants focus on their most distressing worries and ruminations, despite the fact that they were using higher levels of reappraisal than the control condition.

This premise that the ER training was not long enough is consistent with the nature of emotion-focused psychological interventions, which typically dedicate multiple therapy sessions to teaching people with GAD and/or MDD these specific strategies. For instance, the Unified Protocol (Barlow et al., 2010; Payne, Ellard, Farchione, Fairholme, & Barlow, 2014) has two specific modules dedicated to enhancing emotional acceptance
and cognitive flexibility (i.e., cognitive appraisal and reappraisal). In particular, these modules usually span the course of approximately 3-6 sessions at the beginning of treatment. Additionally, there are increasing numbers of ER trainings that are brief, but still significantly more comprehensive than the experiment conducted in this thesis. As a second example, the Affect Regulation Training (ART; Berking & Whitley, 2014) is a transdiagnostic training program designed to enhance ER capabilities (e.g., acceptance and reappraisal) in a didactic fashion. Notably, ART has even been adapted such that it can delivered in three total days when ER skills need to be enhanced over a relatively short period of time (Berking & Whitley, 2014). However, Berking and colleagues still recommend that these daylong trainings be spread out with two weeks between each session in order to provide ample opportunities for skills generalization to occur, which is widely regarded a necessary component of many successful cognitive-behavioral interventions (e.g., Linehan, 1993). To address this, future research should continue to develop innovative ER trainings that can be efficiently disseminated for helping those with GAD and/or MDD manage their worries and ruminations, perhaps in ways that more closely resemble how this process is done in therapy.

**Emotion Regulation Task**

During the ER task that followed the induction, the significant main effects of time revealed that all participants displayed reductions in anxiety and sadness. One possibility is that these reductions in negative affect were a product of habituation (Foa & Kozak, 1986) as the induction ceased and participants adapted to their emotional experiences, which is a central tenet in many exposure-based treatments for anxiety disorders (e.g., Craske & Barlow, 2006; Foa, Yadin, & Lichner, 2012; Hope, Heimberg,
& Turk, 2010). On the other hand, all participants also reported significant increases in acceptance and marginally significant increases in reappraisal during the ER task. Overall, this appears to indicate that, irrespective of condition, all participants were relatively successful in reducing their negative affect, while simultaneously increasing their use of acceptance and reappraisal. As such, one conceivable possibility is that all participants were able to effectively down-regulate the negative affect that they experienced from the worry or rumination induction, particularly by using higher levels of acceptance and reappraisal. However, despite this, participants did not report any significant changes in worry or rumination during the ER task. As previously discussed in the introduction, this could lend support for how difficult it is for people with GAD and/or MDD to break these cycles of repetitive negative thinking.

It is noteworthy that all participants in this clinical sample were utilizing higher levels of acceptance and reappraisal during the ER task, as this suggests that they were directly attempting to manage the emotions associated with their worries and ruminations by implementing adaptive ER strategies. However, their inability to exhibit reductions in worry or rumination specifically might shed light on the remarkable dysfunction that people with GAD and/or MDD have in their inability to achieve the most advantageous effects often associated with adaptive ER. Recent research has demonstrated that participants with GAD (which comprise a majority of this sample) demonstrate one idiosyncratic consequence of employing acceptance and reappraisal as ER strategies. A study by Aldao and Mennin (2012) found that, when participants with GAD utilized acceptance and reappraisal while watching emotion-eliciting film clips, they demonstrated lower heart rate variability (HRV) despite successfully down-regulating
negative affect according to subjective state-level measures similar to those used in this study (Aldao & Mennin, 2012). This is noteworthy given that lower HRV is associated with cardiac rigidity and deficits in flexible ER, and more broadly, is an physiological metric gaining support as a transdiagnostic biomarker for emotion dysregulation and psychopathology (Beauchaine, 2015). Moreover, participants in this study also reported lower perceptions in their abilities to implement acceptance, but not reappraisal, as a regulatory strategy (Aldao & Mennin, 2012), suggesting that participants with GAD may also have deficits in their self-efficacy for using strategies such as acceptance.

An alternative explanation for why participants experienced a reduction in negative affect, but not worry or rumination, is that these strategies themselves are functionally used to reduce negative affect. For instance, people with GAD might worry in order to reduce or avoid anxious arousal (Borkovec et al., 2004). In addition, people with MDD who habitually ruminate might believe that they are obtaining a better understanding of the causes and consequences of their emotions (e.g., sadness) in the short-term, when in reality they are getting stuck in a rut of ruminative thinking that might exacerbate depression in the long-term (Nolen-Hoeksema et al., 2008). These widely studied theories regarding the function of worry and rumination might explain why participants reported reductions in negative affect, but not the state-level use of worry or rumination regardless of which condition they were assigned to.

**Differential Effects of a Worry Versus Rumination Induction**

A secondary hypothesis consisted of examining whether the worry and rumination inductions had differential consequences on affect and use of ER strategies. This was important to analyze, given that the focus of my thesis was exclusively on the *first overall*
induction, meaning that some participants received a worry induction first, whereas others received a rumination induction first since they were completed in a counterbalanced order to reduce any order effects. As such, I elected to add induction type (i.e., worry or rumination) to the MANOVA models. These exploratory analyses revealed that, those participants who received a worry induction first experienced a significant pre-post increase in both state anxiety and sadness during the induction, but not worry or rumination. On the other hand, those participants who received a rumination induction first experienced a significant increase in state sadness and rumination, but not anxiety or worry. As such, the worry induction did not result in significant increases in state worry, and it also demonstrated less specificity in inducing negative affect given that it led to increases in both anxiety and depression. However, the rumination induction demonstrated greater specificity and was differentiated from the worry induction given that it was successful in inducing sadness and rumination which are more closely linked to MDD, but not worry and anxiety, which are more closely associated with GAD (e.g., Borkovec, 1994; Fresco et al., 2002; Hong, 2007; Nolen-Hoeksema et al., 2008).

Given that there was less empirical support for the efficacy of the worry induction used in this study, it becomes prudent to discuss potential reasons why it did not lead to significant increases in state worry from pre- to post-induction. It is plausible that the worry induction deviated too far from those that have been empirically validated and used extensively in the literature (e.g., Andrews & Borkovec, 1988; Borkovec & Inz, 1990; Ruscio & Borkovec, 2004). For example, although these inductions were idiographic, they focused on participant’s most distressing worries and ruminations during diary Phase One, which occurred in the week before participants came into the
Perhaps a more robust way of eliciting worry or rumination is to ask participants to consider *current* situations or thoughts that might be distressing to them (see Ruscio & Borkovec, 2004 for an example using this method for inducting worry), rather than focus on ones that have already occurred in the past. In this vein, additional worries or ruminations may have surfaced for these participants but were not considered for the inductions given the experimental design of the present study.

Moreover, the rumination induction prompts used in the present study was derived from Nolen-Hoeksema’s widely used rumination induction that has been well validated (e.g., Nolen-Hoeksema, 1991; Nolen-Hoeksema & Morrow, 1993). However, for the worry induction used in the present study, I generated prompts by asking participants to focus on symptoms of GAD (e.g., restlessness, muscle tension) and anxious apprehension regarding the future (e.g., how bad the consequences could be, how uncertain everything feels). When considering this in the context of theoretical models of worry, substantial literature suggests that worry is a verbal linguistic, thought-based activity that inhibits vivid mental imagery and associated anxious arousal (e.g., Behar, Zuellig, & Borkovec, 2005; Borkovec, 1994; Borkovec & Inz, 1990; Borkovec et al., 2004). Along these lines, participants with GAD may have been using their “default” levels of worry during the induction as a coping strategy to: 1) balance verbal/linguistic aspects of their worries with the imagery-based aspects that they were trying to avoid or suppress (e.g., picturing something catastrophic happening in their mind), and 2) modulate their increasing anxiety levels as the induction progressed. Given that nearly the entire sample was diagnosed with GAD, this could potentially explain why the worry induction was unsuccessful in increasing state-level worry, but was successful in
increasing state-level anxiety. Future research should continue to refine and expand upon ways of optimizing methodologies for inducing worry and further elucidating the functional role of worry.

Nevertheless, a closer look at these data reveal that there could be an alternate explanation for why the worry induction was apparently unsuccessful in inducing worry for the entire sample. When initially analyzing the data, I first entered two time points into the MANOVA model (T4: pre-induction and T5: post-induction) in order to observe the effects of the first overall induction, which was the focus of hypothesis #1. Interestingly, this preliminary model revealed a marginally significant two-way interaction ($p = .05$) between condition and time (T4: pre-induction and T5: post-induction), such that those in the control condition exhibited a significant increase in state worry from pre- to post-induction ($p = .021$, partial $\eta^2 = .129$), whereas those in the ER training condition did not ($p = .662$, partial $\eta^2 = .005$). In other words, when only entering the pre- and post-inductions time points to the MANOVA model, those participants in the ER training condition were relatively buffered against increases in state worry, whereas those in the control condition were not. However, in order to test a more parsimonious statistical model consistent with my study hypotheses, I elected to also include the post-ER task time point to the MANOVA model such that it comprised three total time points. Although this initial finding should be interpreted with a degree of caution, it is possible that the blunted response of participants in the ER training condition may have “watered down” the success of the worry induction in actually inducing worry.

Along these lines, a primary limitation of this study is the low sample size ($N = 41$), which reduced statistical power and may have precluded me from finding any
significant two-way interactions between time and condition given that each condition only included approximately 20 participants. As such, it will be essential to either collect more data by recruiting additional clinical participants who meet diagnostic criteria in order to bolster the results of the present study, or test similar hypotheses in other studies with larger samples that have greater statistical power to detect effects between groups, in this case an ER training condition and a control condition.

In summary, I developed and tested a brief ER training that sought to help people diagnosed with GAD and/or MDD disengage from their most distressing worries and ruminations. Specifically, the ER training taught participants two adaptive ER strategies (acceptance and reappraisal) that are at the core of CBT and contemporary emotion-focused treatments. Although some of my study hypotheses were not supported, this laboratory-based study provides an experimental framework for investigating the nuanced mechanisms by which maladaptive ER strategies (i.e., worry and rumination) and negative affect (i.e., anxiety and sadness) can be ameliorated through the use of more adaptive ER strategies (i.e., acceptance and reappraisal). Moreover, certain aspects of this study (e.g., ideographic inductions, a novel ER training and control condition, an uninstructed method for assessing the use of learned ER strategies) can hopefully serve as a stepping-stone for promising areas of future research that might help researchers and clinicians better understand the nature of worry and rumination in GAD and MDD, with the ultimate goal of enhancing psychological interventions and reducing the overall suffering associated with these conditions.
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Appendix A

Compensation Structure

Participants who signed up via the Research Experience Program (REP) were compensated in the following manner:

1) 0.5 REP credits for every two diaries that are completed on days 1-4 and 6-9 (for a total of 2 REP credits)
2) 1 REP credit for completing the diary and questionnaires on day 5
3) 1 REP credit for completing the diary and questionnaires on day 10
4) 1 REP credit for completing the SCID-I assessment in the lab
5) 2 REP credits for completing the experimental task in the lab
6) A bonus of 1 REP credit for completing six or more total diary entries including the two longer diaries on days 5 and 10

Thus, participants who signed up via the REP earned up to 8 credits. The REP credits were posted to their account within 72 hours of study completion.

Participants from the general community were compensated in the following manner:

1) $1 for every diary entry that is completed on days 1-4 and 6-9 (for a total of $8)
2) $5 for completing the diary and questionnaires on day 5
3) $5 for completing the diary and questionnaires on day 10
4) $10 for completing the SCID-I assessment in the lab
5) $15 for completing the experimental task in the lab

6) A bonus of $5 for completing six or more total diary entries including the two longer diaries on days 5 and 10

Thus, participants recruited from the general community earned up to $48 total. These participants received their compensation in one installment at the end of the study either via cash or an Amazon gift card delivered to their email address.
Appendix B

Descriptions and Examples of Worry and Rumination

Worry:

WORRY involves repeatedly thinking about something that makes you feel really anxious or uneasy. Typically, people worry about an issue whose outcome is uncertain, but has the possibility of one or more negative (or bad) outcomes. These thoughts or even mental images are usually undesirable (you don’t want them) and are relatively uncontrollable. People tend to worry about things that will happen in the future, as the outcome is not known. People who worry a lot typically experience feelings of anxiety since the future is unknown and there is a chance that something bad may happen. Also, people who worry a lot frequently feel “on-edge” or restless, and may experience physical sensations such as tense muscles and stress. Someone who worries often may describe him/herself as a “worry wart.”

Now, let’s go over an example of WORRY…

WORRY Example: I keep thinking, “what if I fail my final exam tomorrow?” I’m always worrying about my grades and my friends call me a “worry wart.” This makes me feel really anxious and uneasy not knowing how I will do on this exam.

This constitutes a WORRY because it meets the following criteria:
• You will find out your grade in the future
• Outcome is unknown (you don’t know what you will get on your final exam)
• Outcome can be bad (a failing grade)
• You don’t like having these thoughts and can’t control them
• This causes uneasy feelings of anxiety, stress, and tension

Rumination:

RUMINATION, on the other hand, consists of people repetitively focusing their attention on distressing emotions that they may experience (feeling depressed, for example) and the possible causes and consequences of feeling that way. Rumination involves repeatedly thinking about these emotions over and over again, and focusing on the circumstances surrounding these emotions. People tend to ruminate about things that have already happened in the past.

Also, people who ruminate a lot typically experience feelings of sadness, since they are constantly thinking about mistakes they have made in the past and what these mistakes might mean to themselves and/or other people. When people ruminate, they might think about their personal failures, about how distressed they feel, and what feeling this way means. A lot of times when people ruminate, they think that they are getting closer to figuring things out, but really they are getting stuck in a rut.

Now, let’s go over an example of RUMINATION…
**RUMINATION Example**: I failed a test yesterday and now I feel really sad. I can’t stop thinking about why I always react like this and why I feel the way I do. I keep thinking about this situation and the consequences of feeling this way. Failing this test was all of my fault and now I feel like a failure.

This constitutes a **RUMINATION** because it meets the following criteria:

- The event already happened in the **past** (you failed your test yesterday and feel sad about it)
- You repeatedly think why you react this way
- You think about why you feel sad, and all of the consequences of feeling sad
- You focus on all of your shortcomings and feel like a failure
- This causes more feelings of sadness
Appendix C

Rumination/Worry Quiz

1. Which of the following is focused on the future or an event that has not occurred yet?
   a. Worry
   b. Rumination

2. Which of the following is focused on the past or an event that has already occurred?
   a. Worry
   b. Rumination

3. People who worry a lot will most likely experience feelings of what?
   a. Sadness
   b. Anxiety
   c. Happiness

4. People who ruminate a lot are most likely to experience feelings of what?
   a. Sadness
   b. Anxiety
   c. Happiness

Note: Correct answers are bolded.
Appendix D

Different Examples of Worry and Rumination Used in the Laboratory

Now, we will present you simple examples of WORRY and RUMINATION.

**WORRY Example:** "I really want to ask this person out on a date, but I am worried they will say no. Not knowing how they will respond in this situation makes me feel anxious, tense, and uneasy."

**RUMINATION Example:**

"I was in a bad mood yesterday and ended up yelling at my significant other for no reason. I feel terrible that I did this, and now I feel sad. I can't stop thinking about my feelings and the mistake I made."

These situations could make you feel a lot of different emotions. For example, you may feel anxious, sad, or even angry.
Appendix E

Emotion Regulation (ER) Training

Cognitive Reappraisal:

The emotion regulation strategy we will teach you now is called COGNITIVE REAPPRAISAL. COGNITIVE REAPPRAISAL involves reinterpreting your thoughts or the way you think about a situation in order to change the emotions that you feel. The key to COGNITIVE REAPPRAISAL is reframing your thoughts in a different way to feel less negative emotions, such as feeling less sad, anxious, or angry. For example, thinking about something differently may change the way you feel about it. Hopefully reinterpreting your thoughts will help you feel better about it. When trying to cognitively reappraise your thoughts or a situation, you could try to focus on the positives of what you are going through or trying to “look on the bright side of things.” You can tell yourself that there is always a positive side to the things we experience, so you could focus on that instead of all the negatives.

Acceptance:

The emotion regulation strategy we will teach you now is called ACCEPTANCE. ACCEPTANCE involves allowing yourself to experience the emotions that you are feeling. In order to better accept your emotions, it sometimes helps to just observe your
emotions for what they are. The key to ACCEPTANCE is NOT trying to CHANGE your emotions, but instead just acknowledging them and allowing yourself to experience these emotions. To make this easier, try to view your emotions in a non-judgmental way.

Sometimes we feel better about the emotions we experience if we just accept them for what they are. You should not try to understand what these feelings might mean. Rather, just focus on your present experience of these emotions. You should not only accept your emotions, but also accept any thoughts or physical sensations that may be related to how you feel.
Appendix F

Control Training: Location Description Strategies

Proximity Description:
We will now teach you a location description strategy called a PROXIMITY DESCRIPTION. A proximity description involves describing where something is located based on what is around it. The key to a proximity description is giving plenty of examples of places that are close to or near a certain location. For example, you could describe what stores, buildings, landmarks or streets are near a certain location. When trying to think of a proximity description, you could try to imagine yourself being at this specific location and visualizing what is around you. Describing things that are nearby to someone else may help them better understand where this place is located.

Sensory Description:
We will now teach you a location description strategy called a SENSORY DESCRIPTION. A sensory description involves describing a location using information from your 5 senses: touch, smell, hearing, sight, and sound. The key to a sensory description is to remember what senses you may have experienced while at this location. The more details you can provide about these 5 senses, the more likely someone else can truly understand what it may be like to be at this location, such as what it looks, sounds, and smells like.
Appendix G

Worry and Rumination Induction Prompts

Worry Prompts

1. How bad the consequences could be
2. How uncertain everything feels
3. How “keyed up” or “on edge” you feel
4. How tense you feel
5. How thoughts are racing through your mind
6. How out of control you feel
7. How stressed you feel
8. How restless you feel
9. How agitated you feel
10. How you would feel if something bad happened
11. How anxious you feel
12. How hard it is to stop worrying

Rumination Prompts:

1. The way you feel inside
2. Why you react the way you do
3. How you wish this situation had gone better
4. Why things turn out the way they do
5. How helpless you feel
6. Why you get this way sometimes
7. What people noticed about you in this situation
8. How you could have handled this situation better
9. Any regret you may feel
10. How hopeless you feel
11. How sad and depressed you feel
12. All of your shortcomings, failures, and mistakes

**Note:** All prompts were preceded by the phrase “think about…”
Appendix H

List of Tables

Table 1.

*Diagnostic Information and Clinician Severity Ratings for Each Condition*

<table>
<thead>
<tr>
<th>Diagnostic Variable</th>
<th>ER Condition (n = 21)</th>
<th>Control Condition (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAD cases</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>GAD CSR</td>
<td>5.25 (.91)</td>
<td>5.16 (.834)</td>
</tr>
<tr>
<td>MDD cases</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>MDD CSR</td>
<td>5.38 (.74)</td>
<td>4.78 (.97)</td>
</tr>
<tr>
<td>Dysthymia cases</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Dysthymia CSR</td>
<td>4.67 (.58)</td>
<td>4 (0)</td>
</tr>
<tr>
<td>GAD+MDD cases</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Number of comorbid diagnoses</td>
<td>1.29 (1.38)</td>
<td>0.90 (1.12)</td>
</tr>
</tbody>
</table>

*Note:* CSR ratings in the tables above reflect means with standard deviations in parentheses.
Table 2.

*Demographic Variables for Each Condition*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ER Condition (n = 21)</th>
<th>Control Condition (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20.14 (2.95)</td>
<td>19.85 (2.23)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>66.67% (n = 14)</td>
<td>90% (n = 18)</td>
</tr>
<tr>
<td>Male</td>
<td>23.81% (n = 5)</td>
<td>10% (n = 2)</td>
</tr>
<tr>
<td>Other</td>
<td>9.52% (n = 2)</td>
<td>N/A</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>76.2% (n = 16)</td>
<td>85% (n = 17)</td>
</tr>
<tr>
<td>Asian</td>
<td>9.5% (n = 2)</td>
<td>5% (n = 1)</td>
</tr>
<tr>
<td>Black</td>
<td>4.8% (n = 1)</td>
<td>5% (n = 1)</td>
</tr>
<tr>
<td>Native American</td>
<td>9.52% (n = 2)</td>
<td>N/A</td>
</tr>
<tr>
<td>Other</td>
<td>4.8% (n = 1)</td>
<td>10% (n = 2)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>4.8% (n = 1)</td>
<td>10% (n = 2)</td>
</tr>
</tbody>
</table>

*Note:* Percentages do not add up to exactly 100% given that participants were allowed to select more than one race or ethnicity that they self-identify with.
Table 3.

Means and SDs for Self-Report Questionnaires for Each Condition

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>ER Condition (n = 21)</th>
<th>Control Condition (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CES-D</td>
<td>22.71 (10.18)</td>
<td>21.68 (10.44)</td>
</tr>
<tr>
<td>GAD-7</td>
<td>10.33 (4.43)</td>
<td>9.68 (4.37)</td>
</tr>
<tr>
<td>GADQ (without skip-out)</td>
<td>8.91 (2.22)</td>
<td>7.98 (1.82)</td>
</tr>
<tr>
<td>GADQ (with skip-out)***</td>
<td>8.03 (3.18)</td>
<td>6.00 (2.66)</td>
</tr>
<tr>
<td>PSWQ</td>
<td>66.00 (8.89)</td>
<td>63.37 (8.96)</td>
</tr>
<tr>
<td>RRS: Brooding*</td>
<td>12.43 (3.09)</td>
<td>14.21 (2.72)</td>
</tr>
<tr>
<td>ERQ: Reappraisal</td>
<td>3.97 (1.05)</td>
<td>4.17 (1.22)</td>
</tr>
<tr>
<td>DERS: total score</td>
<td>102.48 (20.88)</td>
<td>106.11 (26.70)</td>
</tr>
<tr>
<td>DERS: nonacceptance</td>
<td>17.14 (7.06)</td>
<td>19.58 (6.23)</td>
</tr>
<tr>
<td>FFMQ: total score</td>
<td>108.29 (19.07)</td>
<td>112.79 (20.17)</td>
</tr>
<tr>
<td>CBAS: total score</td>
<td>72.24 (20.27)</td>
<td>71.42 (21.69)</td>
</tr>
<tr>
<td>ECS: PLD subscale</td>
<td>27.1 (8.15)</td>
<td>28.58 (10.44)</td>
</tr>
</tbody>
</table>

Notes: ***p < .05; * .10 < p < .05. Means and standard deviations for the DERS nonacceptance subscale was added to this table given its relevance to the construct of acceptance, which was one of the ER strategies taught during the ER training.
Table 4.

*Means and SDs for Baseline VAS Ratings at the Start of the Experimental Paradigm (T1)*

<table>
<thead>
<tr>
<th>VAS Rating</th>
<th>ER Condition (n = 21)</th>
<th>Control Condition (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline VAS Anxiety</td>
<td>38.81 (22.16)</td>
<td>36.50 (28.94)</td>
</tr>
<tr>
<td>Baseline VAS Sadness</td>
<td>28.43 (23.53)</td>
<td>22.60 (25.97)</td>
</tr>
<tr>
<td>Baseline VAS Worry</td>
<td>47.57 (25.35)</td>
<td>44.40 (30.09)</td>
</tr>
<tr>
<td>Baseline VAS Rumination</td>
<td>25.38 (20.28)</td>
<td>23.35 (22.50)</td>
</tr>
<tr>
<td>Baseline VAS Acceptance</td>
<td>64.90 (25.70)</td>
<td>60.60 (24.28)</td>
</tr>
<tr>
<td>Baseline VAS Reappraisal</td>
<td>24.62 (20.91)</td>
<td>29.75 (19.30)</td>
</tr>
</tbody>
</table>

*Notes:* ***$p < .05$***
Table 5.

*Means and SDs for VAS Ratings at the Pre-Training (T2) and Post-Training (T3) Time Points*

<table>
<thead>
<tr>
<th>VAS Rating</th>
<th>Time point</th>
<th>ER Condition (n = 21)</th>
<th>Control Condition (n = 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS Anxiety</td>
<td>Pre-training</td>
<td>34.57 (23.14)</td>
<td>39.20 (28.39)</td>
</tr>
<tr>
<td></td>
<td>Post-training</td>
<td>34.57 (19.85)</td>
<td>32.35 (28.91)</td>
</tr>
<tr>
<td>VAS Sadness</td>
<td>Pre-training</td>
<td>26.52 (23.93)</td>
<td>22.35 (27.01)</td>
</tr>
<tr>
<td>VAS Worry</td>
<td>Pre-training</td>
<td>42.81 (23.96)</td>
<td>44.55 (30.88)</td>
</tr>
<tr>
<td></td>
<td>Post-training</td>
<td>39.10 (20.30)</td>
<td>37.30 (32.28)</td>
</tr>
<tr>
<td>VAS Rumination</td>
<td>Pre-training</td>
<td>25.19 (21.69)</td>
<td>20.10 (23.67)</td>
</tr>
<tr>
<td></td>
<td>Post-training</td>
<td>27.05 (19.27)</td>
<td>15.60 (20.42)</td>
</tr>
<tr>
<td>VAS Acceptance</td>
<td>Pre-training</td>
<td>62.71 (28.77)</td>
<td>56.85 (23.97)</td>
</tr>
<tr>
<td></td>
<td>Post-training</td>
<td>64.86 (24.76)</td>
<td>59.95 (25.90)</td>
</tr>
<tr>
<td>VAS Reappraisal</td>
<td>Pre-training</td>
<td>26.38 (22.78)</td>
<td>30.55 (20.95)</td>
</tr>
<tr>
<td></td>
<td>Post-training</td>
<td>47.14 (28.48)</td>
<td>28.25 (21.35)</td>
</tr>
</tbody>
</table>
Table 6.

Means and SDs for VAS Ratings at the Pre-Induction (T4), Post-Induction (T5), and Post-ER Task (T7) Time Points

<table>
<thead>
<tr>
<th>VAS Rating</th>
<th>Induction Time Point</th>
<th>ER Condition (n = 21)</th>
<th>Control Condition (n = 20)</th>
<th>Full Sample (N = 41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS Anxiety</td>
<td>Pre-induction</td>
<td>36.24 (19.11)</td>
<td>36.75 (29.20)</td>
<td>36.49 (24.24)</td>
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<td></td>
<td>Post-induction</td>
<td>43.81 (23.67)</td>
<td>44.00 (29.35)</td>
<td>43.90 (26.26)</td>
</tr>
<tr>
<td></td>
<td>Post-ER</td>
<td>36.19 (21.01)</td>
<td>39.00 (30.89)</td>
<td>37.56 (26.00)</td>
</tr>
<tr>
<td>VAS Sadness</td>
<td>Pre-induction</td>
<td>23.14 (22.47)</td>
<td>16.55 (21.84)</td>
<td>19.93 (22.14)</td>
</tr>
<tr>
<td></td>
<td>Post-induction</td>
<td>35.76 (24.73)</td>
<td>34.50 (2.44)</td>
<td>35.15 (23.36)</td>
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<tr>
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<td>Post-ER</td>
<td>27.24 (21.94)</td>
<td>25.80 (21.90)</td>
<td>26.54 (21.66)</td>
</tr>
<tr>
<td>VAS Worry</td>
<td>Pre-induction</td>
<td>39.90 (22.59)</td>
<td>37.00 (31.17)</td>
<td>38.49 (26.81)</td>
</tr>
<tr>
<td></td>
<td>Post-induction</td>
<td>38.14 (25.49)</td>
<td>46.85 (29.19)</td>
<td>42.39 (27.37)</td>
</tr>
<tr>
<td></td>
<td>Post-ER</td>
<td>36.33 (20.15)</td>
<td>40.95 (32.02)</td>
<td>38.59 (26.37)</td>
</tr>
<tr>
<td></td>
<td>Post-induction</td>
<td>44.67 (24.14)</td>
<td>36.05 (26.61)</td>
<td>40.46 (25.56)</td>
</tr>
<tr>
<td></td>
<td>Post-ER</td>
<td>37.19 (23.40)</td>
<td>33.10 (25.62)</td>
<td>35.20 (24.29)</td>
</tr>
<tr>
<td>VAS Acceptance</td>
<td>Pre-induction</td>
<td>61.90 (26.85)</td>
<td>57.95 (26.28)</td>
<td>59.98 (26.32)</td>
</tr>
<tr>
<td></td>
<td>Post-induction</td>
<td>57.90 (25.85)</td>
<td>49.90 (26.93)</td>
<td>54.00 (26.36)</td>
</tr>
<tr>
<td></td>
<td>Post-ER</td>
<td>65.10 (21.00)</td>
<td>59.25 (25.72)</td>
<td>62.24 (23.31)</td>
</tr>
<tr>
<td>VAS Reappraisal</td>
<td>Pre-training</td>
<td>47.14 (28.48)</td>
<td>28.25 (21.35)</td>
<td>37.93 (26.71)</td>
</tr>
<tr>
<td></td>
<td>Post-induction</td>
<td>44.43 (27.52)</td>
<td>25.80 (18.05)</td>
<td>35.34 (24.94)</td>
</tr>
<tr>
<td></td>
<td>Post-ER</td>
<td>45.86 (27.29)</td>
<td>35.70 (26.45)</td>
<td>40.90 (27.04)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54.43 (28.34)</td>
<td>44.60 (28.34)</td>
<td>49.63 (28.42)</td>
</tr>
</tbody>
</table>

Continued
Note: Given that participants in the ER training condition reported significantly higher state-level reappraisal at the post-training time point (T3), these VAS ratings were included in the MANOVA models when predicting state reappraisal.
Table 7.

Means and SDs for Pre- and Post-Induction VAS Ratings Broken Down by Induction Type

<table>
<thead>
<tr>
<th>VAS Rating</th>
<th>Induction Type</th>
<th>Time Point</th>
<th>ER Condition (n = 21)</th>
<th>Control Condition (n = 20)</th>
<th>Full Sample (N = 41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS Anxiety</td>
<td></td>
<td>Pre-induction</td>
<td>38.90 (19.20)</td>
<td>42.25 (32.93)</td>
<td>40.73 (26.97)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-induction</td>
<td>45.80 (24.85)</td>
<td>54.75 (30.90)</td>
<td>50.68 (28.03)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-ER</td>
<td>45.50 (20.49)</td>
<td>47.67 (34.09)</td>
<td>46.68 (28.10)</td>
</tr>
<tr>
<td>VAS Worry</td>
<td></td>
<td>Pre-induction</td>
<td>33.82 (19.61)</td>
<td>28.50 (21.94)</td>
<td>31.58 (20.20)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-induction</td>
<td>42.00 (23.59)</td>
<td>27.88 (18.52)</td>
<td>36.05 (22.23)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-ER</td>
<td>27.73 (18.43)</td>
<td>26.00 (21.00)</td>
<td>27.00 (19.00)</td>
</tr>
<tr>
<td>VAS Sadness</td>
<td></td>
<td>Pre-induction</td>
<td>24.70 (20.82)</td>
<td>15.83 (21.14)</td>
<td>19.86 (20.98)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-induction</td>
<td>28.20 (21.64)</td>
<td>29.25 (22.95)</td>
<td>28.77 (21.84)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-ER</td>
<td>27.10 (20.86)</td>
<td>20.42 (20.02)</td>
<td>23.45 (20.20)</td>
</tr>
<tr>
<td>VAS Rumination</td>
<td></td>
<td>Pre-induction</td>
<td>21.73 (24.80)</td>
<td>17.63 (24.28)</td>
<td>20.00 (23.99)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-induction</td>
<td>42.64 (26.33)</td>
<td>42.38 (20.53)</td>
<td>42.53 (23.43)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-ER</td>
<td>27.36 (23.90)</td>
<td>33.88 (23.41)</td>
<td>30.11 (23.27)</td>
</tr>
<tr>
<td>VAS Worry</td>
<td></td>
<td>Pre-induction</td>
<td>44.00 (21.99)</td>
<td>44.67 (34.12)</td>
<td>44.36 (28.59)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-induction</td>
<td>49.10 (30.07)</td>
<td>55.67 (32.62)</td>
<td>52.68 (30.92)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-ER</td>
<td>43.00 (22.87)</td>
<td>50.58 (33.97)</td>
<td>47.14 (29.04)</td>
</tr>
<tr>
<td>VAS Rumination</td>
<td></td>
<td>Pre-induction</td>
<td>36.18 (23.54)</td>
<td>22.50 (34.12)</td>
<td>31.68 (23.52)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-induction</td>
<td>28.18 (16.02)</td>
<td>33.63 (17.54)</td>
<td>30.47 (16.43)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-ER</td>
<td>30.27 (16.01)</td>
<td>26.50 (23.93)</td>
<td>28.68 (19.21)</td>
</tr>
<tr>
<td>VAS Worry</td>
<td></td>
<td>Pre-induction</td>
<td>28.10 (18.57)</td>
<td>16.83 (20.90)</td>
<td>21.95 (20.24)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-ER</td>
<td>34.50 (16.01)</td>
<td>25.92 (23.93)</td>
<td>29.82 (19.21)</td>
</tr>
</tbody>
</table>

Continued
<table>
<thead>
<tr>
<th></th>
<th>Pre-induction</th>
<th>Post-induction</th>
<th>Post-ER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Induction</strong></td>
<td>(18.17)</td>
<td>(27.94)</td>
<td>(23.87)</td>
</tr>
<tr>
<td>Post-ER</td>
<td>33.80</td>
<td>29.50</td>
<td>31.45</td>
</tr>
<tr>
<td></td>
<td>(19.93)</td>
<td>(28.05)</td>
<td>(24.32)</td>
</tr>
<tr>
<td><strong>Rumination</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-induction</td>
<td>21.45</td>
<td>14.50</td>
<td>18.53</td>
</tr>
<tr>
<td>Post-induction</td>
<td>(21.29)</td>
<td>(23.56)</td>
<td>(21.91)</td>
</tr>
<tr>
<td>Post-ER</td>
<td>53.91</td>
<td>51.25</td>
<td>52.79</td>
</tr>
<tr>
<td></td>
<td>(26.41)</td>
<td>(15.99)</td>
<td>(22.11)</td>
</tr>
<tr>
<td><strong>Worry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-induction</td>
<td>56.10</td>
<td>59.08</td>
<td>57.73</td>
</tr>
<tr>
<td>Post-induction</td>
<td>(27.16)</td>
<td>(31.84)</td>
<td>(29.15)</td>
</tr>
<tr>
<td>Post-ER</td>
<td>56.60</td>
<td>49.17</td>
<td>52.55</td>
</tr>
<tr>
<td></td>
<td>(25.08)</td>
<td>(32.30)</td>
<td>(28.82)</td>
</tr>
<tr>
<td><strong>Reappraisal</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-induction</td>
<td>67.18</td>
<td>56.25</td>
<td>62.58</td>
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<td>(16.61)</td>
<td>(23.12)</td>
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<td>51.00</td>
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<td>(18.06)</td>
<td>(23.87)</td>
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<td>(28.93)</td>
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<td>(21.26)</td>
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<td>33.73</td>
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<td>28.88</td>
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<td>(18.69)</td>
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<td>(29.45)</td>
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**Note:** Given that participants in the ER training condition reported significantly higher state-level reappraisal at the post-training time point (T3), these VAS ratings were included in the MANOVA models when predicting state reappraisal.
Appendix I

List of Figures

Figure 1.

Lab Session Flow Chart
Figure 2.

*Flow Diagram of Study Recruitment Phases*

- Participants opened the link on Qualtrics for diary #01 to enroll in the study (N = 136)
  - 8 participants elected to not participate in the study and did not provide informed consent
  - 3 participants were excluded based on psychiatric information provided in diary phase #01
  - 53 participants discontinued their participation during diary phase #01
  - 13 participants were run as pilot data collected prior to the SCID-I assessment being added to the research protocol

- Participants were brought into the lab and administered the SCID-I (N = 59)
  - 1 participant did not speak English and had difficulty understanding questions from the SCID-I
  - 15 participants were excluded based on diagnostic information collected from the SCID-I
  - 1 participant was excluded from statistical analyses because he had conceptual difficulties with the ER strategies taught during the ER training

- Participants included in the present analyses (N = 41)

- Participants randomized to the ER training condition (n = 21)
- Participants randomized to the control training condition (n = 20)
Figure 3.

Marginally Significant Two-way Interaction Between Induction Type (Worry or Rumination) and Time Predicting State Anxiety

Note: The three time points in this model are as follows: pre-induction (T4), post-induction (T5), and post-ER task (T7)
Figure 4.

*Marginally Significant Three-Way Interaction Between Induction Type (Worry or Rumination), Time, and Condition Predicting State Anxiety for Induction #1 Overall*

Note: This figure depicts the interaction between induction type and time specifically for participants in the control condition. The three time points in this model are as follows: pre-induction (T4), post-induction (T5), and post-ER task (T7).
Figure 5.

*Marginally Significant Three-Way Interaction Between Induction Type (Worry or Rumination), Time, and Condition Predicting State Anxiety for Induction #1 Overall*

**Note:** This figure depicts the interaction between induction type and time specifically for participants in the ER training condition. The three time points in this model are as follows: pre-induction (T4), post-induction (T5), and post-ER task (T7).
Figure 6.

Significant Two-way Interaction Between Induction Type (Worry or Rumination) and Time Predicting State Sadness

Note: The three time points in this model are as follows: pre-induction (T4), post-induction (T5), and post-ER task (T7).
Figure 7.

*Significant Two-way Interaction Between Induction Type (Worry or Rumination) and Time Predicting State Rumination*

**Note:** The three time points in this model are as follows: pre-induction (T4), post-induction (T5), and post-ER task (T7).