8-2017

Efficacy of Short-Term Emotional Regulation Training on Interference During Cognitive Tasks

Kerry Margaret Cannity
University of Tennessee, Knoxville, kcannity@vols.utk.edu

To the Graduate Council:

I am submitting herewith a dissertation written by Kerry Margaret Cannity entitled "Efficacy of Short-Term Emotional Regulation Training on Interference During Cognitive Tasks." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Jennifer Bolden, Major Professor

We have read this dissertation and recommend its acceptance:

Lance Laurence, Todd Moore, Brian Wilhoit

Accepted for the Council:

Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

Efficacy of Short-Term Emotional Regulation Training on Interference During Cognitive Tasks

A Dissertation Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Kerry Margaret Cannity

August 2017

DEDICATION

This dissertation is dedicated to my parents, Margie and Rick Cannity, my brother, Jeff Cannity, and all my other family, friends, lab mates, and colleagues who have supported me through my graduate school training.

ACKNOWLEDGEMENTS

I would like to thank Dr. Jennifer Bolden and Dr. Derek Hopko for their guidance, support, and encouragement through graduate school. I would also like to thank Dr. Lance Laurence, Dr. Todd Moore, and Dr. Brian Wilhoit for serving on my dissertation committee. In addition, I would like to express my deep gratitude to the research assistants, whose help made this project go as smoothly as possible: project manager Jama Bettis, Andrea Benavides, Alexandra Janie Brackett, Holly Flatt, Elizabeth Martin, Spencer McCurdy, Mackenzie Moore, Patricia Seaver, and Emily Thompson. Thanks also to Megan Carl, Jenna Gilmore, Jonathan Parks Fillauer, and Rebecca Shorter for your help and encouragement throughout this process. Finally, thank you to Mary Ellen Hunsberger and Connie Ogle for everything you have done for me throughout my time at the University of Tennessee.

ABSTRACT

The experience of emotion and attempts to regulate it are universal human phenomena. Emotion regulation is used to alter the affective intensity or tone, behaviors, and consequences associated with an emotional experience. This study examined how two common emotional regulation strategies (mindfulness and distraction) affect attentional performance following a negative mood induction via film. While previous literature has compared emotional regulation strategies' effects on a variety of outcomes, the efficacy of these strategies to reduce cognitive interference caused by negative mood has not been examined. Both mindfulness and distraction are hypothesized to occur through the Attention Deployment mechanism of the Attention phase of emotional experience (Gross, 2014), but they have not been directly compared. Participants received a brief (six-minute) training in mindfulness or distraction or will receive no instructions (control condition). Following an exposure to two sadness-inducing films, they completed a cognitive testing battery, which includes a continuous performance test of attention, a symbol-digit coding task, and an emotionally valenced Stroop paradigm. Despite pre-test differences in self-ratings of sadness and happiness, the mindfulness training somewhat ameliorated the expected decrease in happiness following the negative mood induction. Mindfulness training also was associated with a trend towards better performance across several variables of the continuous performance test and self-corrections on the Stroop task. Individuals who received no emotion regulation instructions tended to perform more slowly on several cards of the Stroop task. Results provided limited support for efficacy of mindfulness training in reducing consequences of a negative mood induction on affect and cognitive performance. Future studies should examine the effect of longer-term interventions for emotion regulation and cognitive

performance and more closely explore the path of emotional experience after emotion regulation interventions.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE
INTRODUCTION

As long as humans have had emotions, they have sought to control them. Theories and strategies of regulating emotion have been debated since the advent of psychoanalysis. As early as 1896, Sigmund Freud described theories of how emotional regulation occurs, as well as how its processes may become pathological (Freud & Gay, 1995; Freud & Strachey, 1989). Neo-Freudians described a variety of defense mechanisms individuals may use to protect themselves against painful emotions, thoughts, or memories (Cramer, 2000; A. Freud, 1946; Paulhus, Fridhandler, & Hayes, 1997; Vaillant, 1992). Researchers from other theoretical orientations have examined emotional regulation in relation to psychopathology, cognition, development, and social bonding (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Cassidy, 1994; Cole, Michel, & Teti, 1994; Gross, 2002; Richards & Gross, 2000).

Sub-disciplines within psychology take varied approaches in studying emotional regulation. Social psychology generally has examined emotional regulation strategies that can be manipulated to increase or decrease response to stimuli, in addition to examining the social consequences of emotional regulation strategies (Gross, 2002; Wegner, Schneider, Carter, & White, 1987). Clinical psychology emphasizes the adaptive and maladaptive emotional regulation strategies of clinical and non-clinical populations (Berking et al., 2008; Blackledge & Hayes, 2001; Gross, 1998b). Developmental psychology views emotional regulation as a lifelong learning process, within which appropriate strategies are encouraged or discouraged based on numerous biological, social, and cultural factors (Cole et al., 1994; Eisenberg, Spinrad, & Eggum, 2010; Kopp, 1989; Thompson, 1991). While these approaches contribute substantially to

their discipline, research that integrates experimental findings and clinical impact has been less prevalent.

Defining Emotional Regulation

It is important to distinguish between the overarching concept of emotional regulation and the specific strategies individuals use to accomplish this goal. Thompson (1991) defines emotional regulation as "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions." Gross (1998b) and Thompson (1994) note that these processes may be effortful or automatic, conscious or unconscious, used to dampen or heighten the emotional experience, to lengthen or shorten an emotional experience, and may occur at various points during the emotional experience, with the general purpose of accomplishing one's goals. This definition is useful to describe the concept of emotional regulation outside of a specific theoretical framework.

The widely accepted course of emotion experience is the gradual fading of an emotion's strength and salience over time – occurring less frequently and with lesser intensity. For example, undergraduates asked to express feelings about an emotionally salient memory gradually expressed fewer thoughts over time than those initially asked to suppress emotional reaction to the memory (Roemer & Borkovec, 1994). This process, identified as habituation by behavioral theorists, results in decreased intensity of a stimulus experience following repeated exposure (Harris, 1943; Thompson & Spencer, 1966).

Researchers diverge in their views on the process of emotional regulation, positing at least three separate models of this process. The interacting cognitive subsystems (ICS) theory, hypothesized by Barnard and Teasdale, states that specific details of a situation are combined

through higher-level processing, activating a pattern or "schema," which leads to the creation of an emotional experience (Barnard, 1985; Barnard & Teasdale, 1991; Teasdale, 1999). These authors suggest that the meaning derived from a given situation likely differs based on the individual's personality and previous experience. Further, in order to regulate or change an emotional experience, an "alternative model" must exist and be activated to modify the existing activated schema.

Teasdale (1999) hypothesized three predominant modes of emotion processing (mindless emoting, conceptualizing/doing, mindful experience/being), which differ based on whether emotional input and its implications are directly experienced or modulated. He likens mindless emoting to expression of emotion without monitoring its longevity or understanding the cyclical, changeable nature of emotions. Conceptualizing of emotions is defined as using only goal-oriented approaches to dealing with emotions, rather than considering one's personal attachment to thoughts and feelings. Thirdly, he defines mindful experience/being as internal reflection on experience without either being immersed in or ignoring one's emotional experience. Based on the mode of emotional processing used, the experience of the emotion may be vastly different.

An individual's perception and understanding of an emotional event also are emphasized in an informational processing framework of understanding emotion regulation. As proposed by Garber, Braafladt, and Zeman (1991), several stages occur during an emotional event that, taken together, create the emotional experience: perception, interpretation, goal setting, response generation, response evaluation, and enactment. In the perception stage, emotional activation that may need to be altered is recognized. Next, during the interpretation stage, the individual identifies the cause of the emotional event and who is responsible for altering it. During goal-

setting, the individual determines if the affect needs to be regulated, then the steps to respond to the emotional stimulus are created during the response generation stage. Next, during the response evaluation stage, the possible outcomes or consequences of the generated responses is considered, and during the last stage (enactment), the behavioral response is implemented. Garber et al. (1991) hypothesize that the availability and modification of information input (which can be affected by psychological disorders, as well as emotion regulation strategies) determine an individual's emotional experience.

Gross (1998b, 2014) proposes the "modal model" of emotion regulation, which emphasizes three components of emotional regulation: the goal or purpose of the emotion regulation, the strategy attempted to achieve this goal, and the eventual outcome of the strategy. The author suggests that while the emotional experience moves forward in time, it also influences future situations and affects, providing the opportunity to alter emotions.

Emotion Regulation Strategies

There are an infinite number of ways to regulate one's emotional experience, whether through internal or external means, automatic or effortful processes, or cognitive, emotional, or behavioral changes. This paper will focus on several strategies used to regulate emotion through internal, cognitive processes of altering affective experience. Commonly identified emotion regulation strategies include acceptance, reappraisal, putting into perspective, problem-solving, positive refocusing, refocus on planning, rumination, suppression, avoidance, self-blame, other-blame, and catastrophizing (Aldao et al., 2010; Garnefski, Kraaij, & Spinhoven, 2001; Garnefski et al., 2002). One obstacle to generalizability of findings in this area is the variety of hypothesized strategies and operational definitions. Within the theoretical framework of the

modal model, Gross (2014) proposes that regulation strategies be grouped based on when they are used during the emotional experience. He proposes a major division between antecedent-focused and response-focused regulation strategies, with the former being alterations in the situation, details, or perceptions of the emotional experience and the latter being modifications to one's emotions, thoughts, or behaviors following the initiation of the emotional response (Gross, 1998a). The modal model organization of regulation strategies further divides strategies based on their specific effect on a mechanism within the emotional experience. Gross (2014) labeled strategies targeting Response Modulation as response-focused, while all strategies earlier in the emotional experience are referred to as antecedent-focused.

For example, Gross suggests that distraction targets Attentional Deployment to reduce conscious exposure to negative emotion, while reappraisal works on Cognitive Change. Researchers have also suggested that individuals do not utilize only one means of emotional regulation, but instead use a variety of strategies based on personality and situational factors (Gross & John, 2003). Following are findings related to the most commonly studied regulation strategies: avoidance, distraction, mindfulness, reappraisal, suppression and acceptance. They are presented based on the organization hypothesized by Gross (2014) and highlighted below (*Fig. 1*), with the earlier strategies first, followed by those occurring later in the emotional experience.

Avoidance

Avoidance is a regulation strategy in which an individual denies or refuses to acknowledge an emotional experience or its consequences in order to change the strength or frequency of distress associated with the situation (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). This strategy can be viewed as an attentional regulation strategy or a behavioral strategy

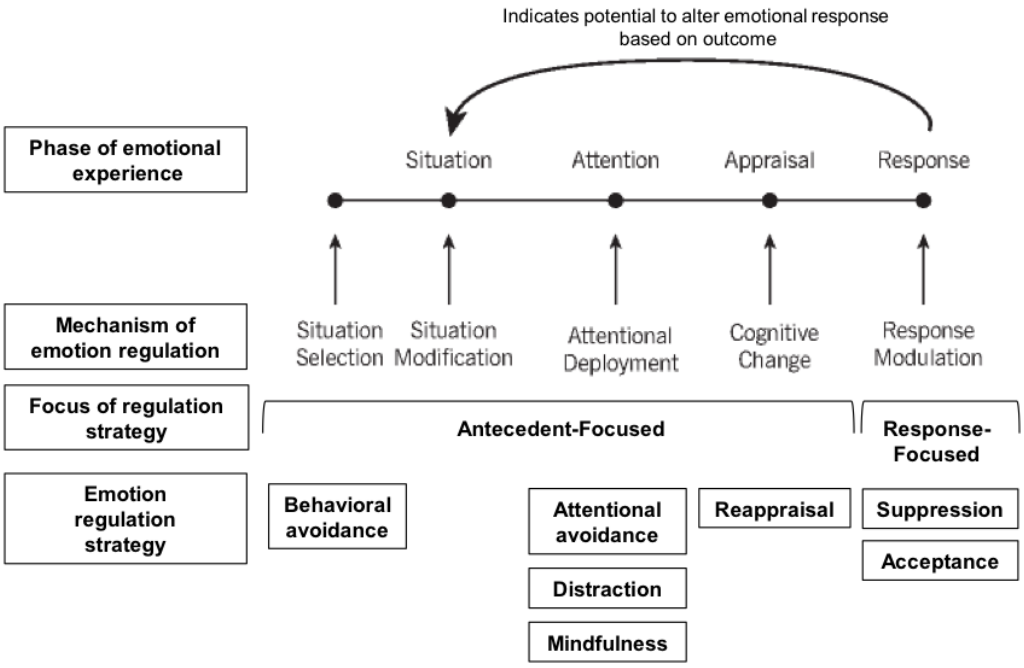

Figure 1. Timeline of emotional experience and regulation strategies (adapted from the modal model organization of emotion regulation strategies: Gross, 2014). Each phase of the emotional experience occurs during any affective event. Individuals have the capacity to regulate their emotions by altering the mechanism by which information is received during the relevant phase of the emotional experience. Some strategies occur before the full emotional experience occurs (antecedent-focused), while others occur after the full emotional experience has begun (response-focused). In addition, a variety of strategies exist to regulate emotional experience. In the above figure, they are divided based on which mechanism they alter within the affective experience.

(i.e. reducing emotional distress by modifying or avoiding triggering situations; Gross, 1998b; Hayes et al., 1996; Luoma, Hayes, & Walser, 2007). The temporal course of attentional avoidance begins with sharp behavioral and physiological responses to a triggering stimulus, followed by an extended period of avoiding the emotion through multiple modalities (cognitive, attentional, affective), reducing the conscious experience of emotional upset (Derakshan, Eysenck, & Myers, 2007).

Avoidance is an effective means of reducing short-term distress without taxing cognitive resources (Roth & Cohen, 1986; Sheppes & Gross, 2012; Wegner & Gold, 1995). Both situational avoidance and emotional avoidance may be useful in avoiding hazardous or emotionally distressing experiences (Hayes et al., 1996). However, long-term use of this strategy, as with suppression, does not allow habituation to the emotional experience (Lazarus, 1998; Rachman, 1981). Frequent use of attentional avoidance predicts heightened reported emotional response to anxiety-provoking stimuli, but not heightened cognitive or physical symptoms of anxiety (Feldner, Zvolensky, Eifert, & Spira, 2003; Karekla, Forsyth, & Kelly, 2004; Sloan, 2004; Spira, Zvolensky, Eifert, & Feldner, 2004). Further, individuals who report a high level of emotional avoidance initially are likely to report fewer positive experiences and greater negative affective experiences over time (Kashdan, Barrios, Forsyth, & Steger, 2006). The cause of this relationship remains unclear: are individuals led to use avoidance due to high emotional reactivity, or does heightened emotional avoidance causes high emotional reactivity?

Distraction

Distraction works to alter emotion by focusing attention away from emotionally activating stimuli during an affective event (Gross, 2014; Thiruchselvam, Blechert, Sheppes,

Rydstrom, & Gross, 2011). Focusing on distressing aspects of a stimuli results in higher self-reported distress and stronger neural reactivity than focusing on neutral aspects of the stimuli (Thiruchselvam, Hajcak, & Gross, 2012). This strategy occurs through the Attentional Deployment mechanism in the Attention phase of emotional experience, altering one's attentional focus to increase or decrease the target affect (Gross, 2014; McRae et al., 2010).

Distraction can occur using internal or external stimuli (Sheppes & Gross, 2012). For example, individuals report focusing on counter-valenced thoughts to reduce negative emotion (e.g. thinking about something positive to reduce feelings of sadness; Wenzlaff, Wegner, & Roper, 1988). Distraction can also be focused outward; directing attention towards less unpleasant areas of distressing images results in lessened emotional and neurological response than focusing on highly distressing areas of the image (Dunning & Hajcak, 2009). This regulation strategy has been found to occur early in the emotional experience and to rapidly reduce emotional distress in the short term (Thiruchselvam et al., 2011). When allowed to choose an emotion regulation strategy in a highly emotionally distressing situation, individuals used distraction more frequently than other regulation strategies (Sheppes, Scheibe, Suri, & Gross, 2011). Distraction can be effectively used to reduce perception of pain and reduce memory encoding during a distressing emotional experience without significant cognitive, neurological, or physiological disruption (Bantick et al., 2002; Sheppes & Meiran, 2007, 2008).

However, frequent use of distraction (as well as suppression) to regulate emotion has been linked to increased response in anxiety-provoking situations (Spira et al., 2004). While distraction can effectively modulate emotion initially, it does not allow for habituation to the emotional experience (Rachman, 1981). This may account for heightened emotional and

neurological response during re-exposure to affectively-charged stimuli after previously distracting oneself from it (Thiruchselvam et al., 2011).

Mindfulness

Mindfulness is an attentional regulation strategy in which an individual attempts to focus on present emotional experience with openness and curiosity and without judgment or attempting to change it (Bishop et al., 2004; Sheppes & Gross, 2012). This practice evolved from Eastern meditation techniques and Buddhist traditions (Bishop et al., 2004; Hạnh, 1976), as well as techniques from psychological orientations including behaviorism, CBT, and psychodynamic psychotherapy (Martin, 1997). Commonly, in therapeutic practice, it is linked with acceptance in a few different ways: non-judgmental acceptance of emotions as a necessary component of mindfulness, mindfulness as one component of the larger goal of acceptance in everyday life situations, as two terms for the same strategy, or as two separate emotion regulation strategies. For the purpose of this paper, mindfulness and acceptance will be discussed separately, as they have been hypothesized to be used at different points in the emotional experience (Sheppes & Gross, 2012).

Short-term and long-term use of mindfulness have been shown to reduce self-reported negative affect, but findings on its effect on physiological arousal have been equivocal. Some studies showing decreased physiological response to emotional distress following mindfulness training (Tang et al., 2009), while other studies show no difference in physiological response in mindfulness versus control groups (Erisman & Roemer, 2010; Ortner, Kilner, & Zelazo, 2007). Self-reported use of mindfulness is negatively correlated with use of suppression and avoidance (Hayes & Feldman, 2004; Kumar, Feldman, & Hayes, 2008) and with distress related to

emotional regulation (Hill & Updegraff, 2012). Mindfulness also has been positively correlated with emotional awareness and differentiation (Hill & Updegraff, 2012) and reduced fatigue and anxiety (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010; Zeidan, Johnson, Gordon, & Goolkasian, 2010). Long-term use of mindfulness has been associated with greater positive affect and psychological well-being (Davidson et al., 2003; Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Ortner et al., 2007).

Reappraisal

The goal of reappraisal is to transform the meaning of an emotional event by altering one's interpretation of it (Ochsner et al., 2004; Sheppes & Gross, 2012). This strategy seems to occur late in the emotional process – during the Appraisal phase – as hypothesized by Gross (2014) and demonstrated through neuroimaging (Thiruchselvam et al., 2011). However, reappraisal is believed to occur before the full experience of the emotion, while suppression (a more behavioral strategy) occurs after the emotion has occurred – an effortful attempt to change the emotion after the fact (Forsyth, Eifert, & Barrios, 2006; Gross, Richards, & John, 2006).

The process of reappraisal begins once the emotional stimuli has been attended to, as the stimulus is beginning to enter cognition and gain meaning. At that point, the meaning or importance of the event is re-examined, and in the case of down-regulation of negative emotions, its impact is now viewed as less severe or personal (Thiruchselvam et al., 2011). This process is believed to be effective because it allows experience of the emotion, as well as some habituation to it, without allowing one to be overwhelmed by its consequences (Macnamara, Ochsner, & Hajcak, 2011; Walter et al., 2009; Wilson & Gilbert, 2008). Forsyth et al. (2006) hypothesize that reappraisal can be more flexible than other regulation strategies, taking many possible forms

in an attempt to change one's understanding of an emotion. For example, if an individual is attempting to alter feelings of anger, they may reappraise their anger as healthy aggression, self-righteousness, or motivation for change; suppression can only allow the individual to reduce visible expression of the emotion.

Research has identified numerous positive short-term and long-term consequences of reappraisal. This strategy is effective in regulating emotional experience, while still providing an opportunity to habituate to distress (Nezlek & Kuppens, 2008; Sheppes & Gross, 2012). Use of reappraisal has been linked to lower intensity and less frequent experience of anger (Martin & Dahlen, 2005; Szasz, Szentagotai, & Hofmann, 2011). It has not been shown to significantly increase mental burden or physiological arousal (Gross & Levenson, 1993; Ray, McRae, Ochsner, & Gross, 2010). While use of reappraisal and suppression were reported at commensurate rates by an undergraduate sample (Gross et al., 2006), individuals who frequently utilize reappraisal tend to have closer friendships and be better liked by peers. Reappraisers also tended to show fewer symptoms of depression, higher life satisfaction, increased sense of control, and higher self-esteem (Gross & John, 2003; Nezlek & Kuppens, 2008).

Few criticisms of reappraisal have emerged, although this strategy occurs later in the emotional experience than some other regulation strategies, and it does come with some cognitive cost (Thiruchselvam et al., 2011). One study which allowed individuals to choose the regulation strategy they used found that participants were more likely to use reappraisal than other strategies to deal with low-intensity emotional stimuli (e.g. pictures of sad faces that have been rated as slightly emotionally activating; (Sheppes et al., 2011). This suggests that while this

strategy is viewed as an appropriate tool to deal with some emotional distress, individuals tend to revert to other regulation strategies when in a highly activating emotional situation.

Suppression

Suppression is defined as a strategy that attempts to inhibit emotionally expressive behavior (Gross & Levenson, 1993; John & Gross, 2004). Some common examples of this strategy include suppressing nervousness about giving a speech, keeping a "poker face" during a card game, or acting unaffected by the hurtful words of a romantic partner (John & Gross, 2004; Sheppes & Gross, 2012). Suppression is generally viewed as a behavioral means of controlling emotion – an effortful attempt to change the emotion after the affective experience has begun (Forsyth et al., 2006; Gross et al., 2006). In Gross's (2014) modal model of emotional regulation, suppression is used late in the emotional experience (targeting the Response Modulation mechanism of the Response phase).

The strategy of suppression can be used to alter affective and cognitive experiences, as well as overt behavior. In the seminal study on the effects of thought suppression, Wegner et al. (1987) found that when undergraduate students were asked to suppress thoughts and vocalizations about a white bear, they later experienced an increase in such thoughts: a phenomenon labeled the "rebound effect." Similarly, individuals asked to suppress the experience of pain during a cold-pressor test reported greater pain during the recovery period than subjects in a distraction or monitoring condition (Cioffi & Holloway, 1993).

The finding that initial suppression can lead to subsequent greater expression has been examined with emotionally salient material as well (Roemer & Borkovec, 1994). Individuals are generally able to suppress thoughts and emotions, when directed to (Roemer & Borkovec, 1994;

Wenzlaff et al., 1988). One hypothesis is that suppression is an attempt to distance oneself from distressing thoughts or emotions, allowing the individual to reduce the immediate internal experience and outward demonstration of negative emotion. However, this process does not allow habituation, a requisite part of the emotional experience (Rachman, 1981). Paradoxically, the individual experiences the "rebound effect," experiencing distress longer or with greater intensity (Wegner & Zanakos, 1994). In laboratory studies, individuals directed to suppress emotions often report a delayed, heightened level of arousal compared to individuals allowed to express their emotions (Campbell-Sills, Barlow, Brown, & Hofmann, 2006a; Eifert & Heffner, 2003; Feldner, Zvolensky, Eifert, & Spira, 2003; Gross, 1998a; Hofmann, Heering, Sawyer, & Asnaani, 2009; Levitt, Brown, Orsillo, & Barlow, 2004; Roemer & Borkovec, 1994). Findings have been mixed with regard to physiological arousal and suppression: some studies have found that individuals instructed to use suppression demonstrate increased physiological arousal (e.g. heart rate, skin conductance, vasoconstriction) compared with individuals utilizing other emotional regulation strategies (Campbell-Sills et al., 2006a; Gross, 1998a; Hofmann et al., 2009; Richards & Gross, 1999), while others have found no significant differences in physiological arousal between emotional suppression and emotional acceptance conditions (Eifert & Heffner, 2003; Feldner et al., 2003; Karekla et al., 2004; Levitt et al., 2004). In laboratory experiments incorporating social interactions, individuals instructed to engage in suppression reported an increased in negative emotion and poorer communication than individuals asked to use reappraisal or who received no instructions. Both subjects in the suppression group and their interactional partners exhibited heightened blood pressure response during the task (Butler et al., 2003).

In addition to documented short-term negative effects, the long-term use of suppression has been associated with stronger negative emotional reactions, fewer positive emotional experiences, lower self-esteem, lower life satisfaction, decreased sense of control, and poorer interpersonal relationships (English & John, 2013; Gross & John, 2003). However, despite well-documented negative consequences of suppression, this regulation strategy is very common in everyday interactions; a sample of undergraduates reported using emotional suppression 3.8 times per week on average – the same frequency as reported use of reappraisal (Gross et al., 2006). There are few studies that demonstrate positive effects of suppression. Suppression may allow short-term reduction of negative emotion, greater affective self-control, and increased ability for impression management in social situations. Frequent use of suppression has been shown in some studies to correlate with lower levels of distress and more resilience from negative life events (Bonanno & Field, 2001; Bonanno, Galea, Bucciarelli, & Vlahov, 2006; Bonanno, Noll, Putnam, O'Neill, & Trickett, 2003; Seery, Silver, Holman, Ence, & Chu, 2008).

Acceptance

Acceptance attempts to regulate emotion by being curious and open to the experience without attempting to actively control it or ruminate on its consequences (Sheppes & Gross, 2012). While similar to mindfulness, acceptance is hypothesized to occur through the Response Modulation mechanism of the Response phase of emotional experience, during which individuals select how to exhibit the emotion and begin to understand the implications of the emotion (Gross, 2014). While these two strategies (mindfulness and acceptance) work similarly to allow an individual greater awareness of affect and thoughts, they target different phases of emotional experience: mindfulness targets attention towards internal processes, while acceptance

aims to increase understanding and thoughtfulness about one's response to the emotional situation. The process of acceptance begins with the experience of the emotion, followed by a conscious or unconscious effort to view and accept without judgment the experience and its consequences (Hofmann et al., 2009). Because this process occurs later in the emotional experience than other regulation strategies, acceptance frequently is directed at the consequences of emotion, rather than attempting to change the affective and situational input.

Use of acceptance results in lower self-reported distress to emotionally activating material (Eifert & Heffner, 2003; Levitt et al., 2004). This strategy also is associated with lessened initial physiological response and quicker return to baseline after exposure to distressing material in some studies (Campbell-Sills, Barlow, Brown, & Hofmann, 2006b; Dunn, Billotti, Murphy, & Dalgleish, 2009), but not in others (Eifert & Heffner, 2003). Levitt et al. (2004) found that individuals using acceptance reported being more willing to engage in a similar experience in the future, suggesting that use of acceptance may have far-reaching implications for later situation selection.

Most studies conceptualize acceptance as a positive regulation strategy, but a few studies have identified negative consequences of using this strategy. Acceptance was related to higher depression scores in an adult and an elderly non-clinical sample (Garnefski & Kraaij, 2006). In another study, acceptance was positively correlated with adaptive anger control, but also was found to correlate with depression, stress, and unhealthy anger suppression (Martin & Dahlen, 2005). One explanation for these findings is a dichotomy within this strategy: maladaptive acceptance resulting in passivity or learned helplessness in response to negative affect compared to acceptance as understanding and ownership of the emotion and its consequences (Garnefski &

Kraaij, 2006; Wilson, 1996). It may be that indiscriminant use of acceptance (e.g. applying it to all emotional experiences) can result in acceptance of feelings that are negative, inappropriate, excessive, or otherwise unhealthy.

Emotion Regulation and Psychological Distress

Research on strategies of emotion regulation, including many of the studies examined above, typically has used non-clinical, undergraduate samples and self-report or experimental designs. However, an important offshoot of this area is examination of relationships between emotional regulation strategies and psychopathology. Psychopathology was significantly associated with lower emotional regulation skills in a sample of German inpatients, and low scores on an emotion regulation skills questionnaire predicted membership in the clinical sample compared to a control sample (Berking et al., 2008). A meta-analysis by Aldao et al. (2010) identified the emotional regulation strategies of avoidance, suppression, and rumination as being highly correlated with psychopathology, while problem-solving and reappraisal were negatively correlated with psychopathology. Garnefski et al. (2002) found that within a clinical sample, individuals were more likely to use rumination and acceptance, while individuals in the non-clinical group were more likely to use positive reappraisal.

Anxiety Disorders

Anxiety disorders have been an area of focus in the emotion regulation literature. Anxiety is often viewed a decreased ability to withstand and regulate negative emotions (e.g. worry in Generalized Anxiety Disorder, the feared stimuli in Specific Phobia). Extreme use of avoidance

is identified as a symptom in specific phobia, agoraphobia, and social phobia, as well as in post-traumatic stress disorder (American Psychiatric Association, 2013; Gross & Jazaieri, 2014).

Self-reported emotional dysregulation correlated strongly with chronic worry and predicted membership in a GAD sample, compared to a control sample (Salters-Pedneault, Roemer, Tull, Rucker, & Mennin, 2006). Symptoms of anxiety have been found to positively correlate with use of avoidance, rumination, and suppression and to negatively correlate with problem-solving and acceptance (Aldao et al., 2010; Salters-Pedneault et al., 2006). Individuals with anxiety are less able to suppress emotionally troubling material than healthy controls (Becker, Rinck, Roth, & Margraf, 1998) and may engage in self-examination or mindfulness to a pathological degree (e.g. hypervigilance to bodily experience in panic disorder; Gross & Jazaieri, 2014). However, another view of anxiety is that worried or ruminative thoughts are a response to emotional distress and actually are a means of avoidance of uncertainty or lack of control (Dugas, Gagnon, Ladouceur, & Freeston, 1998; Rassin, Merckelbach, & Muris, 2000).

Researchers hypothesize that emotional avoidance may be a strong moderator between anxiety and a variety of other variables, including coping strategies, response styles, and perceived control (Kashdan et al., 2006). Another potential moderator is the perceived acceptability of emotions; among individuals with anxiety, belief that emotions are unacceptable has a strong indirect effect on the relationship between suppression and the intensity of negative emotion, although this finding was driven by the female participants in this diagnostic category (Campbell-Sills et al., 2006a).

Obsessive-Compulsive Disorder

Obsessive-compulsive disorder has been highlighted as a thought dysregulation disorder, in which obsessive thoughts are unable to be effectively managed, leading to compulsive undoing behaviors. Use of thought suppression is positively correlated with severity and frequency of OCD symptoms (Rassin, Merckelbach, Muris, & Stapert, 1999; Wegner & Zanakos, 1994). One hypothesis is that individuals with OCD are less able to suppress intrusive thoughts initially, but this theory is only partially supported in the literature (Abramowitz, Tolin, & Street, 2001; Amir, Cashman, & Foa, 1997; Janeck & Calamari, 1999). A counter-intuitive finding of emotion regulation strategies is that individuals with OCD are more likely than healthy controls to use reappraisal, while controls were most likely to use distraction (Amir et al., 1997). It is impossible to assume directionality from this study, but it is possible that this finding demonstrates an evolution which occurs in the course of OCD, where distraction is ineffective in the face of obsessive thinking, leading to unhealthy reappraisal of distressing thoughts as being controlled through compulsive behaviors.

Major Depressive Disorder

Major depressive disorder has also been linked to deficits in emotion regulation. Researchers hypothesize that major depressive disorder is caused by cycles of negative thought without the regulation capabilities to break those patterns (Teasdale, 1999; Teasdale, Segal, & Williams, 1995). Depression is positively correlated with use of avoidance, rumination, and suppression and was negatively correlated with problem-solving and reappraisal (Aldao et al., 2010; Kuyken & Brewin, 1994; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Individuals with depression also demonstrate increased rumination, especially with negative or depressogenic

content (Nolen-Hoeksema, 2000; Teasdale, 1999). The relationship between depression and use of distraction is less clear; mildly depressed individuals directed to use distraction showed a significant reduction in depressive affect, while more highly depressed individuals did not show similar relative relief following the distraction procedure (Fennell, Teasdale, Jones, & Damlé, 1987).

Individuals with a history of depression may engage in deliberate suppression of depressogenic thoughts in an attempt to reduce relapse, but such strategies are more likely to fail over time or with increased cognitive burden (Wenzlaff & Bates, 1998). Depressed individuals also demonstrated increased ability to suppress positive thoughts and lessened ability to suppress negative thoughts (Conway, Howell, & Giannopoulos, 1991; Wenzlaff & Bates, 1998). This difference may occur for a variety of reasons, including poorer cognitive efficiency, reduced salience or recall of positive thoughts, or deficient coping strategies, all of which have been linked to depression (Fennell & Teasdale, 1987; Joormann & Siemer, 2004; Joormann, Siemer, & Gotlib, 2007; Teasdale, 1999). The hypothesis that depressed individuals have lessened ability to suppress negative affect has been supported by neuroimaging findings of higher neural activation during a suppression task in individuals with severe depression, compared to those with mild depression or healthy controls (Erk et al., 2010).

Psychological Interventions Targeting Emotion Regulation

Long-Term Treatments

Numerous long-term psychological treatments have been developed that focused exclusively or in part on improving emotional regulation capabilities (Greenberg & Johnson, 1988; Whelton, 2004). Various labels have been applied to treatment exclusively targeted

emotion regulation, including emotion-focused therapy and cognitive-emotional-behavioral therapy (CEBT). Individual, family, group, and school-based therapies targeting emotional regulation have demonstrated improved psychological, emotional, and health outcomes (Smyth & Arigo, 2009; Suveg, Kendall, Comer, & Robin, 2006). Other interventions have been developed, but have not yet demonstrated empirical efficacy in meeting treatment goals or emotional regulation improvement (Corstorphine, 2006; Stanley et al., 2009).

Several empirically-validated long-term psychological treatments have components designed to improve emotion regulation strategies. Cognitive-behavioral therapy is hypothesized to effect change by identifying and modifying negative automatic thoughts and behaviors, an antecedent-regulation approach (Barlow, Allen, & Choate, 2004; Campbell-Sills & Barlow, 2007; Hofmann & Asmundson, 2008; Tarrier, 2010). Improvement in CBT is positively correlated with improvement in emotional regulation abilities in samples of adult inpatients, children, and adolescents (Berking et al., 2008; Cohen, Berliner, & Mannarino, 2010; Slee, Spinhoven, Garnefski, & Arensman, 2008; Suveg, Sood, Comer, & Kendall, 2009), although the directionality of this effect is unclear. Neuroimaging before and after CBT treatment confirm alternations in neurological functioning in areas hypothesized to be important in emotional regulation (Beauregard, 2007). Berking et al. (2008) found that CBT combined with emotional regulation training was even more clinically effective and effective at improving these skills than an only-CBT treatment. Interestingly, within this study, significant improvement of acceptance skills predicted clinical improvement in both conditions, although this regulation strategy is not emphasized as much in CBT as in several contemporary theories discussed below.

Third-wave cognitive therapies such as Dialectical-Behavioral Therapy (DBT) and Acceptance and Commitment Therapy (ACT) emphasize use of mindfulness, reappraisal, and acceptance as means of reducing emotional distress (Hayes & Pierson, 2005; Hofmann, Sawyer, & Fang, 2010; Linehan, Armstrong, Suarez, Allmon, & Heard, 1991; Robins, Ivanoff, & Linehan, 2001). Unlike CBT, which emphasizes modification of negative thoughts and emotions, ACT and DBT focus on mindfulness and acceptance strategies (Hofmann et al., 2010). Mindfulness-Based Stress Reduction (MBSR) therapies seek to improve psychological health through increasing mindful examination of thoughts and feelings without labeling or judging those experiences, and these interventions have demonstrated efficacy (Brantley, 2005; Kabat-Zinn et al., 1992; Miller, Fletcher, & Kabat-Zinn, 1995). Neuroimaging suggests that MBSR may increase emotional regulation abilities and decrease emotional reactivity in relevant brain structures (Goldin & Gross, 2010).

An intriguing new area of research in psychological treatment and emotion regulation is in attentional training programs, generally prescribed for treatment of anxiety disorders and PTSD (Hakamata et al., 2010; Mohlman, 2004). These treatments are hypothesized to reduce negative affect by training individuals' attention away from distress-inducing cues and towards more balanced environmental attention (Amir, Beard, Burns, & Bomyea, 2009; Heeren, Reese, McNally, & Philippot, 2012; Schmidt, Richey, Buckner, & Timpano, 2009). These strategies likely influence emotional regulation during the Attention Modulation mechanism of the Attention phase of the modal model organization, although the few studies specifically examining such training's effect on emotion regulation have produced equivocal findings (Johnson, 2009; Wadlinger, 2009; Wadlinger & Isaacowitz, 2010).

Brief Interventions

Several methods have been used to train emotion regulation strategies in one session. A common method is providing verbal, written, or recorded directions to participants to describe the regulation strategy and instruct them about how to use it. This strategy has been used to train a variety of emotion regulation strategies, including distraction, reappraisal, suppression, and acceptance (Campbell-Sills et al., 2006b; Feldner et al., 2003; Gross, 1998a; Hofmann et al., 2009; Levitt et al., 2004; Szasz et al., 2011; Thiruchselvam et al., 2011).

Experiential methods have also been utilized to facilitate particular emotion regulation strategies. For a one-session training of acceptance, Eifert and Heffner (2003) used both verbal instructions and a physical experience of using a Chinese finger trap as a metaphor for ineffective struggle against emotions. Arch and Craske (2006) exposed participants to a 15-minute focused breathing exercise to induce mindful self-focus. There have not been studies to directly compare descriptive and experiential methods of training emotion regulation strategies, so it remains unclear whether one method is more effective than another.

While brief interventions, like those discussed above, can produce between-group differences – believed to result from the different regulation strategies trained – it is difficult to know with certainty that participants both understand and use the strategy correctly. Direct quizzing on instructions, participant explanation of how they are implementing strategies, and manipulation checks are utilized to ensure adherence to experimental instructions (Eifert & Heffner, 2003; Thiruchselvam et al., 2011).

Cognitive Deficits Associated with Emotional Regulation

A recently developed focus of research is the effect of emotion regulation on cognitive performance, including executive functioning, memory and attention. Such studies examine how short-term or long-term use of specific emotion regulation strategies is related to performance on cognitive tasks. The most widely studied effects of emotional regulation have been in the domain of memory.

Individuals who endorse frequent use of suppression in everyday life tend to have poorer memories, based on both self-report and assessment, while there was no memory effect observed in frequent users of reappraisal (Richards & Gross, 2000). Experimentally-induced suppression has been found to cause poorer memory for both highly and mildly emotional verbal stimuli compared to reappraisal or receiving no instruction (Richards & Gross, 1999; Richards & Gross, 2000). Participants in the suppression condition also reported less confidence in their memory following these tests. This suggests that the experience of suppression provides some cues to the individual that their memory of the task has been impaired. It may be that suppression causes general cognitive interference, which results in poorer memory processing, as well as poorer thought suppression abilities. For example, during a list-learning task, dysphoric undergraduates demonstrated increased interference from a list of words they were supposed to suppress, compared to healthy controls (Hertel & Gerstle, 2003). Interesting, Richards and Gross (2000) did not find any effect of emotional regulation on visual memory, suggesting that this interference may function only in the verbal domain. The authors suggest that suppression may be accomplished through mental verbalizations, which creates interference when the individual also is asked to encode, store, and recall verbal information.

Emotional regulation strategies have been used to improve memory performance. For example, in a sample of depressed and dysphoric individuals, Watkins, Teasdale, and Williams (2000) examined the effect of distraction or rumination on recall of "overgeneral" memories: defined as recall of categories of events or extended events, rather than detailed or singular experiences (Mark, Williams, & Dritschel, 1992). Frequent recall of such memories has been found to correlate with poorer prognosis of recovery from depression (Brittlebank, Scott, Williams, & Ferrier, 1993) and may represent stable, negative views of the world which contribute to the development and maintenance of depression, as hypothesized by Beck (1979, 2005). Watkins et al. (2000) found that participants demonstrated fewer instances of "overgeneral" memory if they completed a distraction task prior to a memory test, compared to completing a rumination-induction task.

Several studies have examined the effects of short-term and long-term mindfulness on cognitive abilities. Following a ten-day intensive mindfulness retreat, participants demonstrated improved working memory and sustained attention, compared to control group (Chambers, Lo, & Allen, 2008). Similar results were found for a four-session mindfulness meditation training, including improved visuo-spatial processing, working memory, and executive functioning (Zeidan, Johnson, Diamond, et al., 2010).

Mindfulness training also has been shown to reduce interference on the emotional Stroop task (Ortner et al., 2007), a variant of the commonly used verbal interference paradigm (Stroop, 1935; Williams, Mathews, & MacLeod, 1996). Interference on Stroop paradigms have been identified across a range of psychological disorders, including anxiety disorders (Becker, Rinck, Margraf, & Roth, 2001; Ehlers, Margraf, Davies, & Roth, 1988; Mathews & MacLeod, 1985;

Mattia, Heimberg, & Hope, 1993); PTSD (Bremner et al., 2004; McNally, Kaspi, Riemann, & Zeitlin, 1990); and eating disorders (Dobson & Dozois, 2004; Smeets, Roefs, van Furth, & Jansen, 2008). Results of emotional Stroop paradigms in depression have been less clear, with many studies finding no difference in performance for depressed and non-depressed samples (Bradley, Mogg, Millar, & White, 1995; Gotlib & McCann, 1984; Mogg, Bradley, Williams, & Mathews, 1993). Gotlib and Cane (1987) did find evidence of emotional Stroop interference in a sample of recently hospitalized, depressed individuals, but upon retesting at discharge, this effect was no longer significant. Interference on the emotional Stroop is hypothesized to occur due to momentary distraction caused by an attempt to suppress emotionally relevant material, leading to poorer inhibition (increased errors and slowed performance) throughout the task (Buhle, Wager, & Smith, 2010). The impact of strategies of emotion regulation on Stroop task performance has not been systematically examined; however, it is not a far reach to suggest that more effective means of regulating emotion would correlate with lessened interference on an emotional Stroop paradigm.

Decreased inhibition abilities have been widely implicated in cognitive disruption due to mood. Joorman and colleagues have hypothesized that rumination, an experience common across a variety of diagnoses, disrupts normal cognitive inhibition processes, leading to poorer inhibition, stronger priming of distressing concepts, and decreased ability to clear unwanted information from working memory (Joormann, Dkane, & Gotlib, 2006; Joormann & Gotlib, 2008). Faulty cognitive inhibition of negative material has been shown to be related to increased use of rumination and decreased use of reappraisal in both healthy and depressed samples (Joormann & Gotlib, 2010).

One potential explanation for worsened performance on cognitive tasks among those asked to alter their emotions is the ego-depletion model hypothesized by Baumeister and colleagues (Baumeister, Bratslavsky, Muraven, & Tice, 1998). They posit that regulation of emotions requires use of mental resources, leaving fewer resources to draw upon during cognitive tasks. This theory is similar to the processing efficiency theory of Eysenck and Calvo (1992), which suggests that the experience of anxiety reduces working memory and processing capacity, resulting in increased effort being necessary to maintain commensurate cognitive performance. These theories were developed to account for worsened cognitive performance associated with psychological disorders, but their hypotheses translate well to research on emotion regulation.

The current study examines two common emotion regulation strategies (mindfulness and distraction) and their effect on cognitive performance following a negative mood induction. These strategies were selected for comparison because both are hypothesized to occur through the Attentional Deployment mechanism during the Attention phase of emotional experience, but have rarely been compared in experimental studies. Mindfulness has been found to be more effective than distraction or rumination in reducing experimentally-induced dysphoric mood (Broderick, 2005) and more effective than distraction in reducing exposure distress in a sample of individuals with OCD (Wahl, Huelle, Zurowski, & Kordon, 2013). Long-term use of distraction and mindfulness were broadly comparable in a sample of individuals with depression, and both were more effective in improving mood than habitual rumination (Huffziger & Kuehner, 2009). By comparing two strategies that are hypothesized to occur at the same phase of

emotional experience, the current study will add to existing literature regarding their comparability.

An additional focus of this study will be the efficacy of emotion regulation strategies to reduce mood-related interference on several cognitive tasks: assessing attention (a computerized continuous performance test), processing speed (*Coding* subtest of the Repeatable Battery for the Assessment of Neuropsychological Status), and emotional interference (emotional Stroop task). While there is existing support for the hypothesis that negative mood will have a detrimental effect on attention and processing speed (Cannity, 2013; Cornblatt, Lenzenweger, & Erlenmeyer-Kimling, 1989; Gualtieri, Johnson, & Benedict, 2006; Nelson, Sax, & Strakowski, 1998; Sévigny, Everett, & Grondin, 2003; Tsourtos, Thompson, & Stough, 2002), and the research on the effect of negative mood on the emotional Stroop paradigm is equivocal, the effects of emotional regulation on these tasks has yet to be examined.

The current study will examine the ability of two emotion regulation strategies to reduce inference on cognitive tasks, following a negative mood induction. Based on previous research, it is likely that mindfulness and distraction have differential impacts on attentional focus and cognitive processing (e.g. Wahl et al., 2013). The current study combines research from clinical and cognitive psychology to evaluate whether emotion regulation training can have a significant impact on attention, visual, and verbal processes, an area of the field that is only beginning to be explored. More broadly, this study will examine one facet of how mood affects cognition and whether short-term training can affect this relationship.

Hypotheses

1. Participants in the mindfulness condition will perform significantly better on the continuous performance test than those in the distraction and control conditions.
2. Participants in the mindfulness condition will complete the Stroop paradigm more quickly and with fewer errors than individuals in the distraction condition.
3. Participants in the mindfulness condition will perform significantly better on the symbol-digit coding test than those in the distraction and control conditions.
4. Participants in all three conditions will report similar levels of initial negative emotion after the negative mood film induction, but those emotions will reduce more quickly in subjects in the mindfulness condition, as demonstrated by visual analog mood rating scales pre- and post-mood induction and post-test.

CHAPTER TWO
METHOD

Participants

Seventy-five non-depressed participants were recruited from undergraduate introductory psychology classes at a large Southeastern university. Participants were assessed for depression based on the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996) and the Anxiety Disorders Interview Schedule (ADIS-IV; DiNardo, Brown, & Barlow, 1994). To be included in the study, participants had to be at least 18 years of age and have minimal symptoms of depression (BDI-II $\leq$ 14), no current diagnosis of depression (ADIS-IV), no current diagnosis attention deficit hyperactivity disorder (self-reported), no current gross cognitive impairment (MMSE < 24; Folstein, Folstein, & McHugh, 1975), no current anti-depressant, anti-anxiety, or stimulant medication use (self-reported), and no current engagement in psychotherapy (self-reported). These exclusion criteria screen out individuals who may experience increased or decreased emotional or cognitive interference not due to the experimental manipulation. Of the 98 participants who signed up for the experiment, 23 were excluded due to not meeting study criteria. Participants provided consent to participate in the study, and the research protocol was approved by the university Institutional Review Board. Students received research credit for their participation.

The sample included 75 participants: 36 males (48%) and 39 females (52%), with an average age of 19.1 (*SD* = 1.05) and education level of 12.6 years (*SD* = 0.90). Ethnic distribution of participants was 76% Caucasian (*n* = 57), 8% African-American (*n* = 6), 1%

Hispanic (n = 1), 9% Asian-American (n = 7), 1% Indian/Middle-Eastern (n = 1), and 4% Mixed Race/Ethnicity (n = 3). Marital status included 57% single (n = 43) and 43% dating (n = 32).

Participants were randomly assigned to complete either a mindfulness training (n = 25), a distraction training (n = 25), or no instruction (n = 25). Descriptive statistics of demographic information are presented in Table 1 [see *Appendix*]. Groups did not differ as a function of age [F (2,72) = 0.33, p = .72], gender [X^2 (2) = 4.17, p = .13], ethnicity [X^2 (3) = 11.32, p = .33], relationship status [X^2 (2) = 4.03, p = .13], sexual orientation [X^2 (6) = 4.03, p = .67], education level [X^2 (6) = 1.82, p = .94], grade point average [X^2 (8) = 4.42, p =.82], religious affiliation [X^2 (10) = 6.67, p = .76], family income [X^2 (10) = 6.68, p = .76], living situation [X^2 (12) = 9.59, p = .65], or pre-test anxiety [F (2,72) = 0.60, p = .55]. Pre-test sadness differed by treatment condition [F (2,72) = 4.64, p = .01]; participants in the distraction condition reported significantly higher levels of sadness than those in the mindfulness [t (48) = -2.01, p = .05] and no-instruction conditions [t (48) = 2.84, p < .01]. Pre-test happiness also showed a trend towards lower happiness ratings by individuals in the distraction condition [F (2,72) = 2.17, p = .12] compared to the mindfulness condition [t (48) = 2.44, p = .02]. However, there was no difference between pre-test happiness ratings between the distraction and no-instruction conditions [t (48) = -0.89, p = .38]. Pre-test sadness and happiness were controlled for in additional analyses.

As shown in Table 1, groups did not differ on pre-experimental self-report measures of depression [F (2,72) = 0.85, p = .43], general anxiety [F (2,72) = 0.19, p = .83], ADHD symptoms [F (2,72) = 0.48, p = .62], or problems with emotion regulation [F (2,72) = 0.25, p = .78]. There were no significant between-group differences in adherence to the emotion regulation training and negative mood induction films, as assessed by observer ratings of participant

interference behavior, off-task behavior, motor movement, energy level, and attention. Descriptive statistics of behavioral observations are presented in Table 2 [see *Appendix*]. In addition, groups did not differ on familiarity with the negative mood induction films [*Bambi*: X^2 (6) = 3.84, p = .70; *The Champ*: X^2 (4) = 5.41, p = .25], the emotion regulation strategy of mindfulness [X^2 (6) = 1.84, p = .93], or the emotion regulation strategy of distraction [X^2 (6) = 0.51, p = 1.00] as evaluated by post-test self-report.

Assessment Measures

Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; DiNardo et al., 1994). The ADIS-IV is a semi-structured interview that comprehensively assesses all anxiety and mood disorders. For this study, only the current major depression and dysthymia modules were administered. The ADIS-IV has good-to-excellent interrater reliability (range of κs = .67-.86) and convergent validity with other indices of anxiety and depression (Brown, Campbell, Lehman, Grisham, & Mancill, 2001).

Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report measure which assesses the severity of depressive symptoms over the past two weeks. Items are rated on a 4-point Likert scale (range = 0-63) with higher scores suggesting increased depression severity. Sample items include assessment of negative mood, crying, and difficulty concentrating. This scale exhibits excellent internal consistency (α = 0.92 for outpatient samples; 0.93 for nonclinical samples) and test-retest reliability (one-week: r = .93; Beck, Steer, Ball, & Ranieri, 1996), as well as strong convergent validity with the Hamilton Psychiatric Rating Scale for Depression. The instrument also has excellent psychometric

properties among depressed younger and older adults (Nezu, Ronan, Meadows, & McClure, 2000). In the current study, internal consistency was moderate (α = .67).

Trait subscale of the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). The Trait subscale of the STAI assesses chronic symptoms of anxiety, with higher scores indicating greater anxiety (range = 20 – 80). The 20-item self-report measure uses Likert-type items, with values ranging from 1 (*not at all*) to 4 (*very much so*). Items include "I feel nervous or restless" or "I worry too much over something that doesn't really matter." The internal consistency of the STAI is very good (α = .88-.92; Spielberger, Gorsuch, & Lushene, 1970). In the current study, internal consistency was good (α = .77).

Barkley Adult ADHD Rating Scale – IV (BAARS-IV: Barkley, 2011). The BAARS-IV is a 30-item self-report measure of current symptoms of attentional problems, including subscales related to inattention, hyperactivity, impulsivity, and slowed cognitive tempo. The scale includes Likert-type items, with values ranging from 1 (*never or rarely*) to 4 (*very often*). Items include "difficulty sustaining attention in tasks or fun activities" and "fidget with hands or feet or squirm in seat." This scale exhibits excellent internal consistency (α = 0.91) and test-retest reliability (two to three weeks: r = .75; Barkley, 2011). In the current study, internal consistency was good overall (α = .87) and moderate for all subscales (α = .58-.80).

Difficulties in Emotion Regulation Scale (DERS: Gratz & Roemer, 2004). The DERS is a 36-item self-report measure of emotion regulation abilities, including subscales assessing awareness, acceptance, goal-directedness, and regulation of emotion. The scale includes Likert-type items, with responses ranging from 1 (*almost never; 0-10% of the time*) to 5 (*almost always; 91-100% of the time*). Items include "I pay attention to how I feel" and "When I'm upset, I

believe that wallowing in it is all I can do." Higher scores on this scale indicate greater difficulty with emotion regulation. This scale has demonstrated high internal consistency (overall $\alpha = .93$; all subscales $\alpha > .80$) and moderate to good test-retest reliability (four to eight weeks: overall $r = .88$; subscales $r = .57$-$.89$; Gratz & Roemer, 2004). In the current study, internal consistency was good ($\alpha = .85$).

Continuous Performance Test (CPT). The CPT is a computerized measure of sustained attention and impulsivity. The current study used three three-minute blocks of stimuli presentation for a total time of nine minutes. Participants were instructed to attend to letters presented one at a time on the screen and to press the left mouse button following a letter being presented twice in a row (a target). For the current study, approximate 33% of items were targets (180 items), while 67% of items were non-targets (360 items). This task provides measures of correct detections, omission errors (failure to respond to a target), commission errors (responding to a non-target), perseveration errors (responding to a non-target following a target presentation), delayed omission errors, and delayed repetition errors. Versions of the continuous performance test have demonstrated moderate to good split-half reliability ($r = .72$-$.90$; Halperin, Sharma, Greenblatt, & Schwartz, 1991; Pollock, 2014) and test-retest reliability ($r = .55$-$.84$; Conners, 2004; Raz, Bar-Haim, Sadeh, & Dan, 2014).

Stroop Test – Emotional variant (Gotlib & McCann, 1984; Stroop, 1935). The Stroop Test is a widely used verbal color naming task which assesses reaction time and inhibition abilities. The standard administration of the test contains three conditions: naming the color of a series of shapes, reading a series of color words, and naming the color of text of a series of color words (some which are congruent with their text color and some which are incongruent; (Killian,

1985). A variation on this test – which includes an additional condition requiring naming the color of text of a series of depression-related words – has been found to show increased reaction time in individuals with depression, compared to healthy controls (Gotlib & Cane, 1987; Gotlib & McCann, 1984). The procedure used in the current study is adapted from the Stroop paradigm of Golden and Freshwater (2002) and the emotional variant of Klieger and Cordner (1990). This version of the task contains five conditions: word reading, color naming, traditional Stroop, Stroop task with neutral words, and Stroop task with depressive words. Each subtask contains 100 items, arranged in rows of 10, in randomly generated order, with no color or word allowed to follow itself in a row. The word lists for the Emotional Stroop items, adapted from Klieger and Cordner (1990), was selected as highly self-descriptive by a sample of depressed individuals (Gotlib & McCann, 1984). The neutral word list was developed by matching the depressive word list by word length, same first letter, and similar frequency of use in the English language (See *Table 3*). Presentation of the neutral- and depressive-word subtasks were counter-balanced to reduce practice effects. Variables generated by this task include completion time for each subtask, number of self-corrections, and number of errors.

Coding Subtest of the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS; Randolph, 2012). The RBANS is a brief screening measure that assesses a variety of neuropsychological functions, including attention, language, visuospatial abilities, and immediate and delayed memory. This battery is available in four different forms, allowing for repeatable testing. The *Coding* subtest is based on the digit-symbol coding paradigm that is commonly used in neuropsychological assessment, and this task has been shown to be sensitive to negative mood (Cannity, 2013). The RBANS has demonstrated adequate test-retest

Table 3. *Word Lists Used for Emotional Stroop Task.*

Neutral Words	Depressive Words
SAT*	SAD
LIVELY	LONELY
HARMLESS	HOPELESS
GENTLY	GUILTY
FOLLOWS	UNHAPPY
UTILITY	DISCOURAGED
DISPOSITION	GLOOMY
GAMBLE	DISMAL
DRAWER	DEPRESSED
DISGUISED	FAILURE

* The word "son," used in Klieger and Cordner (1990), was replaced for the current study due to a strong associated with the subject of the film used for negative mood induction.

reliability between two forms of the test (r = .56-.84; Gold, Queern, Iannone, & Buchanan, 1999; Strunk, Sutton, & Skadeland, 2010). The *Coding* subtest has demonstrated good convergent validity with other forms of the symbol-digit coding paradigm (r = .78-.83; McKay, Casey, Wertheimer, & Fitchenberg, 2007; Pachet, 2007). Participants have 90 seconds to complete the task, and age-normed variables generated by this task include completion time, as well as number of correct and incorrect responses.

Emotion Regulation Training Task

Participants were randomly assigned to either the mindfulness condition, the distraction condition, or no-instruction condition. These instructions were adapted from a method used a prior study (Wahl et al., 2013). All participants were given a series of three instructions, presented in text and verbally, and asked to focus on and think about each item individually (See Table 3). The first instruction was presented for one minute, the second for two minutes, and the

third for three minutes. In the mindfulness condition, they received statements about being aware and nonjudgmental of their emotional experience. In the distraction condition, instructions directed participants to use other thoughts to distance themselves from their experience. In the no-instruction condition, participants saw a series of three statements instructing them to "Continue waiting for the next task." Completion of each procedure took approximately 6 minutes. Participants received a booster presentation of the instructions for their condition following the practice film. For the booster presentation, the first instruction was presented for 30 seconds, the second for one minute, and the third for 1.5 minutes. Completion of the booster procedure took three minutes.

Table 4. *Instructions for Three Conditions of Emotion Regulation Training Task.*

Mindfulness Condition	Distraction Condition	No-Instruction Condition
1. Thoughts are thoughts and not facts. 2. Become aware of your thoughts at this moment. 3. Let your thoughts pass by like clouds in the sky.	1. At this moment, your thoughts are causing you distress. 2. Distract yourself from your thoughts. 3. Silently count backwards by sevens from 700 (i.e. 700, 693, 686…)	1. Continue waiting for the next task. 2. Continue waiting for the next task. 3. Continue waiting for the next task.

Procedure

Participants were randomly assigned to receive either the mindfulness condition, the distraction condition, or the no-instruction condition. After providing informed consent and demographic information and completing pre-test questionnaires, subjects were asked to provide

visual analog scale ratings of current level of sadness, happiness, and anxious mood. Participants then received written and verbal instructions to use either mindfulness, distraction, or no-instruction in regulating their emotions. Next, subjects viewed the first film (Scene of mother deer dying from *Bambi*; Stallings et al., 2011), after which they completed another set of visual analog scales of mood. Then, participants received the booster instructions and saw the second film (Scene of father dying from *The Champ*: Lovell & Zeffirelli, 1979), and afterwards, they repeated the visual analog scale ratings described above. Both film clips have been used extensively in mood-induction research and have been shown to create temporary feelings of sadness (Gross & Levenson, 1995).

Following the emotion regulation instructions and negative mood induction films, participants completed a cognitive assessment battery, which included the emotionally valenced Stroop task, a computerized continuous performance test, and the *Coding* subtest of the RBANS. The sequence of tasks was counterbalanced to prevent order effects. These tasks were chosen because they represent a variety of domains thought to be affected by negative mood, which is hypothesized to be mitigated to a greater or lesser degree by the emotional regulation strategies provided. After completing all tasks, participants were asked to provide a third series of visual analog scales assessing sadness, happiness, and anxiety. Following this, all subjects received the brief distraction instructions to reduce any existing negative affect. All participants received a debriefing explaining the purpose of the study and were provided with referrals for support services.

CHAPTER THREE
RESULTS

Bivariate Correlations

Descriptive data and Pearson Product-Moment correlations among all study pre-test self-report measures are presented in Table 5 [see *Appendix*]. Statistically significant relationships were noted among all self-report measures, including depression (BDI-II), anxiety (STAI), ADHD symptoms (BAARS-IV), and emotion regulation difficulties (DERS). In addition, participants' pre-test rating of sadness and anxiety were also significantly positively correlated with all self-report measures. As expected, pre-test self-ratings of happiness were significantly negatively correlated with all self-report measures and with pre-test self-ratings of sadness and anxiety.

Mood Induction

Descriptive data for self-ratings of mood are presented in Table 6 [see *Appendix*]. There was a significant effect for time across all three visual analog scales of mood: sadness [F (3,71) = 59.38, $p < .01$], happiness [F (3,71) = 27.75, $p < .01$], and anxiety [F (3,71) = 8.29, $p < .01$]. The negative mood induction was successful in increasing self-reported sadness between pre-test and post-mood induction [t (74) = -9.38, $p < .01$]. Self-reported happiness decreased significantly between pre-test and post-mood induction [t (74) = 6.69, $p < .01$]. Interestingly, self-reported anxiety also decreased significantly between pre-test and post-mood induction [t (74) = 2.85, p = .01].

The negative mood induction effect reduced by the end of the cognitive testing battery, such that sadness was significantly lower between post-mood induction and post-cognitive

battery [t (74) = 8.06, p < .01]. Self-reported happiness increased significantly between post-mood induction and post-cognitive battery [t (74) = -5.07, p < .01]. Interestingly, self-reported anxiety increased significantly between post-mood induction and post-cognitive battery [t (74) = -3.88, p < .01]. Self-reported level of sadness remained significantly higher than baseline following the cognitive battery [t (74) = -2.85, p < .01]. Happiness also remained significantly lower than baseline following the cognitive battery [t (74) = 3.06, p < .01]. However, anxiety had returned to baseline by the end of the cognitive battery [t (74) = -0.91, p = .37].

There were several notable differences between groups on visual analog scale (VAS) ratings of sadness, happiness, or anxiety over time. There was a trend towards a time by condition interaction for self-reported sadness [F (3,71) = 1.92, p = .08]; participants in the distraction condition showed a somewhat different pattern of sadness ratings over time compared to those in the no-instruction condition [F (3,71) = 2.45, p = .07]. Further, individuals in the distraction condition showed significantly greater pre-test rating of sadness compared to the mindfulness and no-instruction conditions [F (2,72) = 4.64, p = .01].

There was a significant time by condition interaction for self-report of happiness as well [F (3,71) = 2.59, p = .02]. The pattern of happiness ratings over time was significantly different for individuals in the mindfulness condition compared to those in the distraction condition [F (5,69) = 3.45, p < .01]. Individuals in the mindfulness condition showed higher pre-test ratings of happiness compared to the distraction condition [t (48) = 2.44, p = .02]. Also, participants in the mindfulness condition maintained significantly higher VAS ratings of happiness through the negative mood induction compared to those in the distraction condition [t (48) = 2.66, p = .01].

Cognitive Performance

Overall descriptive data for scores on the cognitive battery can be found in Table 7 [see *Appendix*]. Descriptive data on cognitive performance by condition are presented in Table 8 [see *Appendix*]. Pearson Product-Moment correlations among all study pre-test self-report measures and cognitive tasks are presented in Table 9 [see *Appendix*].

Cognitive performance varied by condition across several variables, when controlling for pre-test sadness and pre-test happiness. There was a trend towards a higher percentage of correct detections in the mindfulness condition compared to the distraction condition [F (3,46) = 2.26, p = .09] and the no-instruction condition [F (3,45) = 2.70, p = .06]. There was a trend towards between-groups difference on percentage of delayed repetition errors [F (4,70) = 2.13, p = .09]. Participants in the mindfulness condition had a lower percentage of delayed repetition errors than individuals in the no-instruction condition [F (3,45) = 3.28, p = .03]. There was also a trend towards a lower percentage of omission errors by participants in the mindfulness condition compared to the distraction condition [F (3,46) = 2.26, p = .09] and the no-instruction condition [F (3,45) = 2.70, p = .06].

There also were significant between-group differences in Stroop task performance. There was a trend towards fewer errors on the Word Reading card by participants in the mindfulness condition compared to those in the distraction condition [F (3,46) = 2.23, p = .10]. On the Color Naming card, there was a trend towards slower total time to completion by participants in the distraction condition compared to those in the no-instruction condition [F (3,45) = 2.41, p = .08]. Self-corrections on the Color Naming card varied significantly between groups [F (4,70) = 2.75, p = .04]; participants in the mindfulness condition made significantly fewer self-corrections than

those in the no-instruction condition [F (3,45) = 2.79, p = .05]. There was a similar trend towards fewer self-corrections on this card by subjects in the mindfulness condition than those in the distraction condition [F (3,46) = 2.39, p = .08].

On the traditional Stroop card, there was a significant between-groups difference in total time to completion [F (4,70) = 2.64, p = .04]. Participants in the no-instruction condition were significantly slower than those in the mindfulness condition [F (3,45) = 3.07, p = .04] and the distraction condition [F (3,45) = 5.21, p < .01]. Performance on the Neutral card of this task revealed slower time to completion by those in the no-instruction condition compared to the distraction condition [F (3,45) = 3.01, p = .04]. On the Depressive card, there was a significant between-groups difference in total time to completion [F (4,70) = 2.67, p = .04]. Participants in the no-instruction condition were significantly slower to complete the card than those in the mindfulness condition [F (3,45) = 2.88, p = .05] and the distraction condition [F (3,45) = 3.52, p = .02]. In addition, there was a trend towards individuals in the mindfulness condition making fewer self-corrections than those in the distraction condition [F (3,46) = 2.42, p = .08] and the no-instruction condition [F (3,45) = 2.20, p = .10].

On the Coding task, there was a trend towards higher scaled scores by individuals in the no-instruction condition compared to the distraction condition [F (3,45) = 2.29, p = .09].

CHAPTER FOUR
DISCUSSION

The current study examined the effect of emotion regulation on reducing cognitive burden during attention tasks. Overall, there was a general trend towards better cognitive performance after a negative mood induction by participants who received a brief mindfulness training compared to those who received a brief distraction training or no emotion regulation training. In addition, results provide limited support for a buffering effect of mindfulness in reducing a dip in happiness following a negative mood induction. These findings represent a step towards integrating literature on the effects of negative mood on cognition, as well as the interaction of mood and emotion regulation.

One goal of the current study was to understand the trajectory of emotional experience following brief mindfulness or distraction training and a negative mood induction in healthy individuals. The film mood induction used in this task was successful in eliciting sadness in participants and decreasing happiness – effects which are commensurate with other studies using this paradigm (Goldin et al., 2005; Gross & Levenson, 1995; Rottenberg, Kasch, Gross, & Gotlib, 2002). Over time, the negative mood induction abated somewhat. Interestingly, subjects' ratings of anxiety decreased following the sadness-inducing films, but increased to baseline during the cognitive testing battery. This pattern has been seen in some studies (e.g. Parrot & Sabini, 1990) but not in others (e.g. Sutherland, Newman, & Rachman, 1982). While anxiety was not a focus of the mood induction, it is possible that the mood induction created a "bottleneck," which directed emotional resources towards the target emotion of sadness and away from the more tangential experience of anxiety. In sum, the mood induction was effective in increasing negative affect and decreasing positive affect for all experimental conditions.

However, results indicate that mindfulness and distraction training may have influenced the pattern of emotion participants experienced over the course of the experiment. There was a trend towards significantly different patterns of sadness over time for the distraction condition compared to the no-instruction condition. Also, there was a trend towards a different pattern of happiness ratings over time for the mindfulness condition compared to the distraction condition. These data provide tentative support for an altered pattern of emotional experience after a negative mood induction for individuals trained in mindfulness, as opposed to those trained in distraction or those who receive no training. However, a confounding factor in this study were significant pre-test differences in sadness and happiness between treatment conditions. While these results provide tentative support for the experimental hypothesis that mindfulness would influence the course of emotional experience during the study, conclusions are limited by unexpected between-group differences despite random assignment. Results of the current study support previous findings, but future studies would benefit from methodology that is further able to demonstrate differential effects of mindfulness training from distraction or other emotion regulation training strategies.

In accordance with study hypotheses, participants who received brief mindfulness training showed a trend towards better performance on correct detections, omission errors, and delayed repetition errors during a continuous performance test. These findings are consistent with previous research documenting the positive effects of long-term mindfulness training on sustained attention (Chambers, Lo, & Allen, 2008). Between-group differences in continuous performance test results suggest a differential effect due to the mindfulness training, but several issues limit the conclusions that can be made. Post-hoc power analyses on CPT variables suggest

that a sample size of approximately 165 participants would be needed to detect the estimated effect. While numerous studies have demonstrated the deleterious effects of negative mood on sustained attention (Cornblatt, Lenzenweger, & Erlenmeyer-Kimling, 1989; Gualtieri, Johnson, & Benedict, 2006; Nelson, Sax, & Strakowski, 1998; Sévigny, Everett, & Grondin, 2003), in the current study, the efficacy of the mindfulness training over the distraction or no-instruction conditions in reducing negative affect is confounded by pre-test between-group differences in sadness and happiness ratings. Despite these limitations, results provide limited support of study hypotheses and previous research on the influence of emotion regulation on the relationship between mood and sustained attention.

On the emotionally valenced Stroop paradigm, several between-groups differences emerged. Participants in the distraction condition demonstrated a trend towards slower time to completion on the Color Naming card, while those in the no-instruction condition showed a trend towards slower completion time on the traditional Stroop, neutral, and depressive cards. Participants in the mindfulness condition showed a trend towards fewer errors on the Word Reading card and fewer self-corrections on the Color Naming and Depressive cards.

These findings did not support the hypothesis that mindfulness training would lead to quicker time to completion than the distraction condition. However, it may be that emotion regulation training in general contributes to quicker performance, while those who received no instruction utilize strategies that are less efficient or create greater cognitive interference. Interestingly, one consistent finding was fewer self-corrections by those in the mindfulness condition compared to the distraction and no-instruction conditions. These results provide limited support for the hypothesis that those in the mindfulness condition would make fewer

errors than those in the distraction or no-instruction conditions. Little research has examined the meaning of self-corrections on an inhibition task like the Stroop paradigm, but it may be that flexibility and awareness are facilitated in mindfulness, which reduces the likelihood of making errors and needing to self-correct.

To further understand these findings, future studies would benefit from a larger sample size to provide more conclusive evidence to support these conclusions. A post-hoc power analysis suggests that a sample size of approximately 169 would be necessary to detect the effects of variables of the emotionally valenced Stroop task. In the current study, pre-existing between-group differences makes it difficult to determine whether between-group differences in mood caused problems in cognitive performance. An additional direction for future studies would be to consolidate findings on the effects of mood and emotion regulation on the emotionally valenced Stroop, as previous work has been inconclusive about whether negative mood has a deleterious effect on performance on this task (Bradley, Mogg, Millar, & White, 1995; Buhle, Wager, & Smith, 2010; Gotlib & Cane, 1987; Mogg, Bradley, Williams, & Mathews, 1993).

Performance on the Coding task revealed no differences in raw scores across conditions. There was a trend towards higher scaled scores by participants in the no-instruction condition compared to the distraction condition. These results run counter to the study hypothesis that individuals in the mindfulness condition would show better performance than those in other groups and goes against previous research suggesting that negative mood is associated with slower processing speed (Cannity, 2013; Tsourtos, Thompson, & Stough, 2002). A possible explanation for this finding is that emotion regulation has a negligible effect on processing speed

– a more automatic cognitive process – than on more complex processes such as sustained attention. An alternative theory is that between-group differences in mood ratings over time were too weak to produce robust differences on this task. In the current study, examination of differential patterns of emotional experience between groups were confounded by pre-test between-group differences in sadness and happiness. In addition, post-hoc power analysis suggests that a sample size of approximately 175 participants would be needed to detect the effect size of symbol-digit coding performance. The current study does not support differential effects of emotion regulation on performance on a symbol-digit coding task, although future studies may be able to more clearly investigate these factors.

There are several limitations of the current study which future studies should seek to address. A larger sample size would enable further exploration of several trends identified in the current study. In addition, a larger sample size may eliminate between-group differences in pre-test sadness and happiness, which appeared despite random assignment to experimental condition. These differences limited interpretation of differences in patterns of emotional experience due to emotion regulation training. Future studies may seek to examine the efficacy of longer-term training and its effects on cognitive performance. In addition, the current study examines two widely used emotion regulation strategies; comparisons of other strategies and of strategies which occur at various times through the emotional experience would further inform this area of research.

The results of the current study suggest that even a brief emotion regulation training in mindfulness may buffer some of the effects of a negative mood induction, leading to a trend towards improved cognitive performance on several attention tasks. This experiment provides a

critical step towards understanding of the relationship between emotion regulation and cognitive performance.

REFERENCES

Abramowitz, J. S., Tolin, D. F., & Street, G. P. (2001). Paradoxical effects of thought suppression: a meta-analysis of controlled studies. *Clinical Psychology Review, 21*(5), 683-703. doi:http://dx.doi.org/10.1016/S0272-7358(00)00057-X

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*(2), 217-237.

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders: DSM-5 (5th ed.). Arlington, VA: American Psychiatric Publishing.

Amir, N., Beard, C., Burns, M., & Bomyea, J. (2009). Attention modification program in individuals with generalized anxiety disorder. *Journal of Abnormal Psychology, 118*(1), 28.

Amir, N., Cashman, L., & Foa, E. B. (1997). Strategies of thought control in obsessive-compulsive disorder. *Behaviour Research and Therapy, 35*(8), 775-IN771.

Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy, 44*(12), 1849-1858. doi:http://dx.doi.org/10.1016/j.brat.2005.12.007

Bantick, S. J., Wise, R. G., Ploghaus, A., Clare, S., Smith, S. M., & Tracey, I. (2002). Imaging how attention modulates pain in humans using functional MRI. *Brain, 125*(Pt 2), 310-319. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11844731

Barkley, R. (2011). Barkley Adult ADHD Rating Scale (BAARS-IV). *New York, NY: Guilford Press*.

Barlow, D. H., Allen, L. B., & Choate, M. L. (2004). Toward a unified treatment for emotional disorders. *Behavior Therapy, 35*(2), 205-230.

Barnard, P. J. (1985). Interacting cognitive subsystems: A psycholinguistic approach to short-term memory. *Progress in the Psychology of Language, 2*(6).

Barnard, P. J., & Teasdale, J. D. (1991). Interacting cognitive subsystems: A systemic approach to cognitive-affective interaction and change. *Cognition and Emotion, 5*(1), 1-39.

Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: is the active self a limited resource? *Journal of Personality and Social Psychology, 74*(5), 1252-1265. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9599441

Beauregard, M. (2007). Mind does really matter: evidence from neuroimaging studies of emotional self-regulation, psychotherapy, and placebo effect. *Progress in Neurobiology, 81*(4), 218-236.

Beck, A. T. (1979). *Cognitive Therapy and the Emotional Disorders* (2nd ed.). New York: International Universities Press.

Beck, A. T. (2005). The current state of cognitive therapy: a 40-year retrospective. *Archives of General Psychiatry, 62*(9), 953-959.

Beck, A. T., Steer, R. A., Ball, R., & Ranieri, W. F. (1996). Comparison of Beck Depression Inventories-IA and-II in psychiatric outpatients. *Journal of Personality Assessment, 67*(3), 588-597.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II.* San Antonio, TX: Psychological Corporation.

Becker, E. S., Rinck, M., Margraf, J., & Roth, W. T. (2001). The emotional Stroop effect in anxiety disorders: General emotionality or disorder specificity? *Journal of Anxiety Disorders, 15*(3), 147-159.

Becker, E. S., Rinck, M., Roth, W. T., & Margraf, J. (1998). Don't worry and beware of white bears: Thought suppression in anxiety patients. *Journal of Anxiety Disorders, 12*(1), 39-55. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9549608

Berking, M., Wupperman, P., Reichardt, A., Pejic, T., Dippel, A., & Znoj, H. (2008). Emotion-regulation skills as a treatment target in psychotherapy. *Behaviour Research and Therapy, 46*(11), 1230-1237.

Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., . . . Velting, D. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*(3), 230-241.

Blackledge, J. T., & Hayes, S. C. (2001). Emotion regulation in acceptance and commitment therapy. *Journal of Clinical Psychology, 57*(2), 243-255. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11180150

Bonanno, G. A., & Field, N. P. (2001). Examining the delayed grief hypothesis across 5 years of bereavement. *American Behavioral Scientist, 44*(5), 798-816.

Bonanno, G. A., Galea, S., Bucciarelli, A., & Vlahov, D. (2006). Psychological resilience after disaster New York city in the aftermath of the September 11th Terrorist Attack. *Psychological Science, 17*(3), 181-186.

Bonanno, G. A., Noll, J. G., Putnam, F. W., O'Neill, M., & Trickett, P. K. (2003). Predicting the willingness to disclose childhood sexual abuse from measures of repressive coping and dissociative tendencies. *Child Maltreatment, 8*(4), 302-318.

Boone, D. E. (1992). Reliability of the WAIS-R with psychiatric inpatients. *Journal of Clinical Psychology, 48*(1), 72-76. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/1556220

Bradley, B. P., Mogg, K., Millar, N., & White, J. (1995). Selective processing of negative information: Effects of clinical anxiety, concurrent depression, and awareness. *Journal of Abnormal Psychology, 104*(3), 532.

Brantley, J. (2005). Mindfulness-based stress reduction. In S. M. Orsillo & L. Roemer (Eds.), *Acceptance and Mindfulness-Based Approaches to Anxiety* (pp. 131-145). New York, NY: Springer.

Bremner, J. D., Vermetten, E., Vythilingam, M., Afzal, N., Schmahl, C., Elzinga, B., & Charney, D. S. (2004). Neural correlates of the classic color and emotional stroop in women with abuse-related posttraumatic stress disorder. *Biological Psychiatry, 55*(6), 612-620.

Brittlebank, A. D., Scott, J., Williams, J. M., & Ferrier, I. N. (1993). Autobiographical memory in depression: State or trait marker? *British Journal of Psychiatry, 162*, 118-121. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/8425125

Broderick, P. C. (2005). Mindfulness and coping with dysphoric mood: Contrasts with rumination and distraction. *Cognitive Therapy and Research, 29*(5), 501-510.

Brown, T. A., Campbell, L. A., Lehman, C. L., Grisham, J. R., & Mancill, R. B. (2001). Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. *Journal of Abnormal Psychology, 110*(4), 585.

Buhle, J., Wager, T., & Smith, E. (2010). Using the Stroop task to study emotion regulation. In R. R. Hassin, K. N. Ochsner, & Y. Trope (Eds.), *Self Control in Society, Mind, and Brain* (pp. 93-113). Oxford University Press.

Butler, E. A., Egloff, B., Wilhelm, F. H., Smith, N. C., Erickson, E. A., & Gross, J. J. (2003). The social consequences of expressive suppression. *Emotion, 3*(1), 48-67. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12899316

Campbell-Sills, L., & Barlow, D. H. (2007). Incorporating emotion regulation into conceptualizations and treatments of anxiety and mood disorders. In J. J. Gross (Eds.), *Handbook of Emotion Regulation* (pp. 542-559). New York, NY: Guilford Press.

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006a). Acceptability and suppression of negative emotion in anxiety and mood disorders. *Emotion, 6*(4), 587.

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006b). Effects of suppression and acceptance on emotional responses of individuals with anxiety and mood disorders. *Behaviour Research and Therapy, 44*(9), 1251-1263.

Cannity, K. M. (2013). The impact of rumination induction on IQ performance. Master's thesis, University of Tennessee. Retrieved from http://trace.tennessee.edu/utk_gradthes/2598

Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. *Monographs of the Society for Research in Child Development, 59*(2-3), 228-249.

Chambers, R., Lo, B. C. Y., & Allen, N. B. (2008). The impact of intensive mindfulness training on attentional control, cognitive style, and affect. *Cognitive Therapy and Research, 32*(3), 303-322.

Cioffi, D., & Holloway, J. (1993). Delayed costs of suppressed pain. *Journal of Personality and Social Psychology, 64*(2), 274.

Cohen, J. A., Berliner, L., & Mannarino, A. (2010). Trauma focused CBT for children with co-occurring trauma and behavior problems. *Child Abuse & Neglect, 34*(4), 215-224.

Cole, P. M., Michel, M. K., & Teti, L. O. D. (1994). The development of emotion regulation and dysregulation: A clinical perspective. *Monographs of the Society for Research in Child Development, 59*(2-3), 73-102.

Conners, C. K. (2004). *Conners' Continuous Performance Test (CPT II) Version 5 for Windows: Technical Guide and Software Manual*. Toronto, Ontario, Canada: Multi-Health Systems.

Conway, M., Howell, A., & Giannopoulos, C. (1991). Dysphoria and thought suppression. *Cognitive Therapy and Research, 15*(2), 153-166. doi:10.1007/BF01173205

Cornblatt, B. A., Lenzenweger, M. F., & Erlenmeyer-Kimling, L. (1989). The continuous performance test, identical pairs version: II. Contrasting attentional profiles in schizophrenic and depressed patients. *Psychiatry Research, 29*(1), 65-85.

Corstorphine, E. (2006). Cognitive–Emotional–Behavioural Therapy for the eating disorders: working with beliefs about emotions. *European Eating Disorders Review, 14*(6), 448-461. doi:10.1002/erv.747

Cramer, P. (2000). Defense mechanisms in psychology today: Further processes for adaptation. *American Psychologist, 55*(6), 637.

Davidson, R. J., Kabat-Zinn, J., Schumacher, J., Rosenkranz, M., Muller, D., Santorelli, S. F., . . . Sheridan, J. F. (2003). Alterations in brain and immune function produced by

mindfulness meditation. *Psychosomatic Medicine, 65*(4), 564-570. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12883106

Derakshan, N., Eysenck, M. W., & Myers, L. B. (2007). Emotional information processing in repressors: The vigilance–avoidance theory. *Cognition and Emotion, 21*(8), 1585-1614.

DiNardo, P., Brown, T., & Barlow, D. (1994). Anxiety Disorders Interview Schedule for DSM-IV: Lifetime version (ADIS-IV-L) New York: NY: Oxford University Press.

Dobson, K. S., & Dozois, D. J. (2004). Attentional biases in eating disorders: a meta-analytic review of Stroop performance. *Clinical Psychology Review, 23*(8), 1001-1022. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/14729421

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*(2), 215-226. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9613027

Dunn, B. D., Billotti, D., Murphy, V., & Dalgleish, T. (2009). The consequences of effortful emotion regulation when processing distressing material: A comparison of suppression and acceptance. *Behaviour Research and Therapy, 47*(9), 761-773. doi:http://dx.doi.org/10.1016/j.brat.2009.05.007

Dunning, J. P., & Hajcak, G. (2009). See no evil: directing visual attention within unpleasant images modulates the electrocortical response. *Psychophysiology, 46*(1), 28-33. doi:10.1111/j.1469-8986.2008.00723.x

Ehlers, A., Margraf, J., Davies, S., & Roth, W. T. (1988). Selective processing of threat cues in subjects with panic attacks. *Cognition & Emotion, 2*(3), 201-219.

Eifert, G. H., & Heffner, M. (2003). The effects of acceptance versus control contexts on avoidance of panic-related symptoms. *Journal of Behavior Therarpy and Experimental Psychiatry, 34*(3), 293-312.

Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology, 6*, 495.

English, T., & John, O. P. (2013). Understanding the social effects of emotion regulation: the mediating role of authenticity for individual differences in suppression. *Emotion, 13*(2), 314-329. doi:10.1037/a0029847

Erisman, S. M., & Roemer, L. (2010). A preliminary investigation of the effects of experimentally induced mindfulness on emotional responding to film clips. *Emotion, 10*(1), 72-82. doi:10.1037/a0017162

Erk, S., Mikschl, A., Stier, S., Ciaramidaro, A., Gapp, V., Weber, B., & Walter, H. (2010). Acute and sustained effects of cognitive emotion regulation in major depression. *Journal of Neuroscience, 30*(47), 15726-15734.

Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition & Emotion, 6*(6), 409-434.

Feldner, M., Zvolensky, M., Eifert, G., & Spira, A. (2003). Emotional avoidance: An experimental test of individual differences and response suppression using biological challenge. *Behaviour Research and Therapy, 41*(4), 403-411.

Feldner, M. T., Zvolensky, M. J., Eifert, G. H., & Spira, A. P. (2003). Emotional avoidance: an experimental test of individual differences and response suppression using biological

challenge. *Behaviour Research and Therapy, 41*(4), 403-411. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/12643964

Fennell, M. J., & Teasdale, J. D. (1987). Cognitive therapy for depression: Individual differences and the process of change. *Cognitive Therapy and Research, 11*(2), 253-271.

Fennell, M. J. V., Teasdale, J. D., Jones, S., & Damlé, A. (1987). Distraction in neurotic and endogenous depression: an investigation of negative thinking in major depressive disorder. *Psychological Medicine, 17*(02), 441-452. doi:doi:10.1017/S0033291700025009

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*(3), 189-198.

Forsyth, J. P., Eifert, G. H., & Barrios, V. (2006). Fear conditioning in an emotion regulation context: A fresh perspective on the origins of anxiety disorders. In M. G. Craske, D. Hermans, & D. Vansteenwegen (Eds.), *Fear and Learning: From Basic Processes to Clinical Applications* (pp. 133-153). Washington, DC: American Psychological Association.

Fredrickson, B. L., Cohn, M. A., Coffey, K. A., Pek, J., & Finkel, S. M. (2008). Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources. *Journal of Personality and Social Psychology, 95*(5), 1045-1062. doi:10.1037/a0013262

Freud, A. (1946). *The ego and the mechanisms of defense*. New York: International Universities Press.

Freud, S., & Gay, P. (1995). *The Freud Reader*: WW Norton & Company.

Freud, S., & Strachey, J. (1989). *An Autobiographical Study*: WW Norton & Company.

Garber, J., Braafladt, N., & Zeman, J. (1991). The regulation of sad affect: An information-processing perspective. In J. Garber & K. A. Dodge (Eds.), *The Development of Emotion Regulation and Dysregulation* (pp. 208-240). New York, NY: Cambridge University Press.

Garnefski, N., & Kraaij, V. (2006). Relationships between cognitive emotion regulation strategies and depressive symptoms: A comparative study of five specific samples. *Personality and Individual Differences, 40*(8), 1659-1669.

Garnefski, N., Kraaij, V., & Spinhoven, P. (2001). Negative life events, cognitive emotion regulation and emotional problems. *Personality and Individual Differences, 30*(8), 1311-1327.

Garnefski, N., Van Den Kommer, T., Kraaij, V., Teerds, J., Legerstee, J., & Onstein, E. (2002). The relationship between cognitive emotion regulation strategies and emotional problems: comparison between a clinical and a non-clinical sample. *European Journal of Personality, 16*(5), 403-420. doi:10.1002/per.458

Gold, J. M., Queern, C., Iannone, V. N., & Buchanan, R. W. (1999). Repeatable Battery for the Assessment of Neuropsychological Status as a screening test in schizophrenia, I: Sensitivity, reliability, and validity. *American Journal of Psychiatry, 156*(12), 1944-1950.

Goldin, P. R., Hutcherson, C. A., Ochsner, K. N., Glover, G. H., Gabrieli, J. D., & Gross, J. J. (2005). The neural bases of amusement and sadness: a comparison of block contrast and subject-specific emotion intensity regression approaches. *Neuroimage, 27*(1), 26-36.

Golden, C. J., & Freshwater, S. (2002). *Stroop Color and Word Test - Revised: Adult Manual for Clincal and Experimental Uses*. Chicago, IL: Stoelting.

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*(1), 83.

Gotlib, I. H., & Cane, D. B. (1987). Construct accessibility and clinical depression: A longitudinal investigation. *Journal of Abnormal Psychology, 96*(3), 199-204. doi:http://dx.doi.org/10.1037/0021-843X.96.3.199

Gotlib, I. H., & McCann, C. D. (1984). Construct accessibility and depression: An examination of cognitive and affective factors. *Journal of Personality and Social Psychology, 47*(2), 427-439. doi:http://dx.doi.org/10.1037/0022-3514.47.2.427

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment, 26*(1), 41-54.

Greenberg, L. S., & Johnson, S. M. (1988). *Emotionally Focused Therapy for Couples*. New York, NY: Guilford Press.

Gross, J. J. (1998a). Antecedent-and response-focused emotion regulation: divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology, 74*(1), 224.

Gross, J. J. (1998b). The emerging field of emotion regulation: an integrative review. *Review of General Psychology, 2*(3), 271.

Gross, J. J. (2002). Emotion regulation: affective, cognitive, and social consequences. *Psychophysiology, 39*(3), 281-291. doi:10.1017.S0048577201393198

Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. In J. J. Gross (Eds.), *Handbook of Emotion Regulation* (2nd ed.), (pp. 3-20). New York, NY: Guildford Press.

Gross, J. J., & Jazaieri, H. (2014). Emotion, emotion regulation, and psychopathology: An affective science perspective. *Clinical Psychological Science, 2*(4), 387-401. doi:10.1177/2167702614536164

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348.

Gross, J. J., & Levenson, R. W. (1993). Emotional suppression: physiology, self-report, and expressive behavior. *Journal of Personality and Social Psychology, 64*(6), 970-986. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/8326473

Gross, J. J., & Levenson, R. W. (1995). Emotion elicitation using films. *Cognition and Emotion, 9*(1), 87-108.

Gross, J. J., Richards, J. M., & John, O. P. (2006). Emotion regulation in everyday life. In D. K. Synder, J. A. Simpson, & J. N. Hughes (Eds.), *Emotion Regulation in Families: Pathways to Dysfunction and Health* (pp. 13-35). Washingon, DC: American Psychological Association.

Gualtieri, C. T., Johnson, L. G., & Benedict, K. B. (2006). Neurocognition in depression: patients on and off medication versus healthy comparison subjects. *Journal of Neuropsychiatry and Clinical Neurosciences, 18*(2), 217-225.

Hakamata, Y., Lissek, S., Bar-Haim, Y., Britton, J. C., Fox, N. A., Leibenluft, E., . . . Pine, D. S. (2010). Attention bias modification treatment: a meta-analysis toward the establishment of novel treatment for anxiety. *Biological Psychiatry, 68*(11), 982-990.

Halperin, J. M., Sharma, V., Greenblatt, E., & Schwartz, S. T. (1991). Assessment of the continuous performance test: reliability and validity in a nonreferred sample. *Psychological Assessment: A Journal of Consulting and Clinical Psychology, 3*(4), 603.

Hạnh, N. (1976). *The Miracle of Mindfulness!: A Manual of Meditation*: Beacon Press.

Harris, J. D. (1943). Habituatory response decrement in the intact organism. *Psychological Bulletin, 40*, 385-422.

Hayes, A. M., & Feldman, G. (2004). Clarifying the construct of mindfulness in the context of emotion regulation and the process of change in therapy. *Clinical Psychology: Science and Practice, 11*(3), 255-262.

Hayes, S. C., & Pierson, H. (2005). Acceptance and commitment therapy. In A. Freeman, S. H. Felgoise, A. M. Nezu, C. M. Nezu, & M. A. Reinecke (Eds.), *Encyclopedia of Cognitive Behavioral Therapy*. New York: Springer.

Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: a functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology, 64*(6), 1152.

Heeren, A., Reese, H. E., McNally, R. J., & Philippot, P. (2012). Attention training toward and away from threat in social phobia: Effects on subjective, behavioral, and physiological measures of anxiety. *Behaviour Research and Therapy, 50*(1), 30-39.

Hertel, P. T., & Gerstle, M. (2003). Depressive deficits in forgetting. *Psychological Science, 14*(6), 573-578. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/14629688

Hill, C. L., & Updegraff, J. A. (2012). Mindfulness and its relationship to emotional regulation. *Emotion, 12*(1), 81-90. doi:10.1037/a0026355

Hofmann, S. G., & Asmundson, G. J. (2008). Acceptance and mindfulness-based therapy: New wave or old hat? *Clinical Psychology Review, 28*(1), 1-16.

Hofmann, S. G., Heering, S., Sawyer, A. T., & Asnaani, A. (2009). How to handle anxiety: The effects of reappraisal, acceptance, and suppression strategies on anxious arousal. *Behaviour Research and Therapy, 47*(5), 389-394.

Hofmann, S. G., Sawyer, A. T., & Fang, A. (2010). The empirical status of the "new wave" of cognitive behavioral therapy. *Psychiatric Clinics of North America, 33*(3), 701-710.

Huffziger, S., & Kuehner, C. (2009). Rumination, distraction, and mindful self-focus in depressed patients. *Behaviour Research and Therapy, 47*(3), 224-230. doi:http://dx.doi.org/10.1016/j.brat.2008.12.005

Janeck, A. S., & Calamari, J. E. (1999). Thought suppression in obsessive-compulsive disorder. *Cognitive Therapy and Research, 23*(5), 497-509.

John, O. P., & Gross, J. J. (2004). Healthy and unhealthy emotion regulation: personality processes, individual differences, and life span development. *Journal of Personality, 72*(6), 1301-1333. doi:10.1111/j.1467-6494.2004.00298.x

Johnson, D. R. (2009). Goal-directed attentional deployment to emotional faces and individual differences in emotional regulation. *Journal of Research in Personality, 43*(1), 8-13.

Joormann, J., Dkane, M., & Gotlib, I. H. (2006). Adaptive and maladaptive components of rumination? Diagnostic specificity and relation to depressive biases. *Behavior Therapy, 37*(3), 269-280. doi:10.1016/j.beth.2006.01.002

Joormann, J., & Gotlib, I. H. (2008). Updating the contents of working memory in depression: interference from irrelevant negative material. *Journal of Abnormal Psychology, 117*(1), 182-192. doi:10.1037/0021-843X.117.1.182

Joormann, J., & Gotlib, I. H. (2010). Emotion regulation in depression: relation to cognitive inhibition. *Cognition & Emotion, 24*(2), 281-298. doi:10.1080/02699930903407948

Joormann, J., & Siemer, M. (2004). Memory accessibility, mood regulation, and dysphoria: difficulties in repairing sad mood with happy memories? *Journal of Abnormal Psychology, 113*(2), 179.

Joormann, J., Siemer, M., & Gotlib, I. H. (2007). Mood regulation in depression: Differential effects of distraction and recall of happy memories on sad mood. *Journal of Abnormal Psychology, 116*(3), 484.

Kabat-Zinn, J., Massion, A., Kristeller, J., Peterson, L., Fletcher, K., Pbert, L., . . . Santorelli, S. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *American Journal of Psychiatry, 149*(7), 936-943.

Karekla, M., Forsyth, J. P., & Kelly, M. M. (2004). Emotional avoidance and panicogenic responding to a biological challenge procedure. *Behavior Therapy, 35*(4), 725-746.

Kashdan, T. B., Barrios, V., Forsyth, J. P., & Steger, M. F. (2006). Experiential avoidance as a generalized psychological vulnerability: Comparisons with coping and emotion regulation strategies. *Behaviour Research and Therapy, 44*(9), 1301-1320. doi:http://dx.doi.org/10.1016/j.brat.2005.10.003

Killian, G. (1985). The Stroop color-word interference test. In D. Keyser & R. Sweetland (Eds.), *Test Critiques* (Vol. II, pp. 751-758). Kansas City, MO: Test Corporation of America.

Klieger, D. M., & Cordner, M. D. (1990). The Stroop task as measure of construct accessibility in depression. *Personality and Individual Differences, 11*(1), 19-27.

Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology, 25*(3), 343.

Kumar, S., Feldman, G., & Hayes, A. (2008). Changes in mindfulness and emotion regulation in an exposure-based cognitive therapy for depression. *Cognitive Therapy and Research, 32*(6), 734-744.

Kuyken, W., & Brewin, C. R. (1994). Stress and coping in depressed women. *Cognitive Therapy and Research, 18*(5), 403-412.

Lazarus, R. S. (1998). The costs and benefits of denial. *Fifty years of the Research and Theory of R. S. Lazarus: An Analysis of Historical and Perennial Issues.* (pp. 227-251). Mahwah, NJ: Earlbaum.

Levitt, J. T., Brown, T. A., Orsillo, S. M., & Barlow, D. H. (2004). The effects of acceptance versus suppression of emotion on subjective and psychophysiological response to carbon dioxide challenge in patients with panic disorder. *Behavior Therapy, 35*(4), 747-766.

Linehan, M. M., Armstrong, H. E., Suarez, A., Allmon, D., & Heard, H. L. (1991). Cognitive-behavioral treatment of chronically parasuicidal borderline patients. *Archives of General Psychiatry, 48*(12), 1060-1064.

Lovell, D. P., & Zeffirelli, F. D. (1979). The Champ [Motion picture]. United States: MGM/Pathe Home Video.

Luoma, J. B., Hayes, S. C., & Walser, R. D. (2007). *Learning ACT: An Acceptance & Commitment Therapy Skills-Training Manual for Therapists*: New Harbinger Publications.

Macnamara, A., Ochsner, K. N., & Hajcak, G. (2011). Previously reappraised: the lasting effect of description type on picture-elicited electrocortical activity. *Social, Cognitive, and Affective Neuroscience, 6*(3), 348-358. doi:10.1093/scan/nsq053

Mark, J., Williams, G., & Dritschel, B. H. (1992). Categoric and extended autobiographical memories. *Theoretical Perspectives on Autobiographical Memory.* (pp. 391-410): Springer.

Martin, J. R. (1997). Mindfulness: A proposed common factor. *Journal of Psychotherapy Integration, 7*(4), 291-312.

Martin, R. C., & Dahlen, E. R. (2005). Cognitive emotion regulation in the prediction of depression, anxiety, stress, and anger. *Personality and Individual Differences, 39*(7), 1249-1260.

Mathews, A., & MacLeod, C. (1985). Selective processing of threat cues in anxiety states. *Behaviour Research and Therapy, 23*(5), 563-569.

Mattia, J. I., Heimberg, R. G., & Hope, D. A. (1993). The revised Stroop color-naming task in social phobics. *Behaviour Research and Therapy, 31*(3), 305-313.

McKay, C., Casey, J. E., Wertheimer, J., & Fichtenberg, N. L. (2007). Reliability and validity of the RBANS in a traumatic brain injured sample. *Archives of Clinical Neuropsychology, 22*(1), 91-98.

McNally, R. J., Kaspi, S. P., Riemann, B. C., & Zeitlin, S. B. (1990). Selective processing of threat cues in posttraumatic stress disorder. *Journal of Abnormal Psychology, 99*(4), 398.

McRae, K., Hughes, B., Chopra, S., Gabrieli, J. D., Gross, J. J., & Ochsner, K. N. (2010). The neural bases of distraction and reappraisal. *Journal of Cognitive Neuroscience, 22*(2), 248-262. doi:10.1162/jocn.2009.21243

Micco, J. A., Henin, A., Biederman, J., Rosenbaum, J. F., Petty, C., Rindlaub, L. A., . . . Hirshfeld-Becker, D. R. (2009). Executive functioning in offspring at risk for depression and anxiety. *Depression and Anxiety, 26*(9), 780-790. doi:10.1002/da.20573

Miller, J. J., Fletcher, K., & Kabat-Zinn, J. (1995). Three-year follow-up and clinical implications of a mindfulness meditation-based stress reduction intervention in the treatment of anxiety disorders. *General Hospital Psychiatry, 17*(3), 192-200.

Mogg, K., Bradley, B. P., Williams, R., & Mathews, A. (1993). Subliminal processing of emotional information in anxiety and depression. *Journal of Abnormal Psychology, 102*(2), 304.

Mohlman, J. (2004). Attention Training as an Intervention for Anxiety: Review and Rationale. *Behavior Therapist, 27*(2), 37-41.

Nelson, E. B., Sax, K. W., & Strakowski, S. M. (1998). Attentional performance in patients with psychotic and nonpsychotic major depression and schizophrenia. *American Journal of Psychiatry, 155*(1), 137-139.

Nezlek, J. B., & Kuppens, P. (2008). Regulating positive and negative emotions in daily life. *Journal of Personality, 76*(3), 561-580. doi:10.1111/j.1467-6494.2008.00496.x

Nezu, A. M., Ronan, G. F., Meadows, E. A., & McClure, K. S. (2000). *Practitioner's Guide to Empirically Based Measures of Depression*. New York: Kluwer Academic/Plenum Publishers.

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology, 109*(3), 504.

Ochsner, K. N., Ray, R. D., Cooper, J. C., Robertson, E. R., Chopra, S., Gabrieli, J. D., & Gross, J. J. (2004). For better or for worse: neural systems supporting the cognitive down- and up-regulation of negative emotion. *Neuroimage, 23*(2), 483-499. doi:10.1016/j.neuroimage.2004.06.030

Ortner, C. N., Kilner, S. J., & Zelazo, P. D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. *Motivation and Emotion, 31*(4), 271-283.

Pachet, A. K. (2007). Construct validity of the Repeatable Battery of Neuropsychological Status (RBANS) with acquired brain injury patients. *Clinical Neuropsychology, 21*(2), 286-93.

Parrott, W. G., & Sabini, J. (1990). Mood and memory under natural conditions: Evidence for mood incongruent recall. *Journal of Personality and Social Psychology, 59*(2), 321.

Paulhus, D. L., Fridhandler, B., & Hayes, S. (1997). Psychological defense: Contemporary theory and research. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of Personality Psychology* (pp. 543-579). San Diego, CA: Academic Press.

Pollock, B. E. (2014). *Attention, hyperactivity, and cognitive performance in adults with Attention-Deficit/Hyperactivity Disorder (ADHD).* Master's, University of Tennessee, Knoxville, TN. Retrived from http://trace.tennessee.edu/utk_gradthes/3171

Rachman, S. (1981). Part I. Unwanted intrusive cognitions. *Advances in Behaviour Research and Therapy, 3*(3), 89-99.

Randolph, C. (2012). *Repeatable Battery for the Assessment of Neuropsychological Status*. San Antonio, TX: The Psychological Corporation.

Rassin, E., Merckelbach, H., & Muris, P. (2000). Paradoxical and less paradoxical effects of thought suppression: a critical review. *Clinical Psychology Review, 20*(8), 973-995. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/11098396

Rassin, E., Merckelbach, H., Muris, P., & Stapert, S. (1999). Suppression and ritualistic behaviour in normal participants. *British Journal of Clinical Psychology, 38 (Pt 2)*, 195-201. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10389600

Ray, R. D., McRae, K., Ochsner, K. N., & Gross, J. J. (2010). Cognitive reappraisal of negative affect: converging evidence from EMG and self-report. *Emotion, 10*(4), 587-592. doi:10.1037/a0019015

Raz, S., Bar-Haim, Y., Sadeh, A., & Dan, O. (2014). Reliability and validity of the online continuous performance test among young adults. *Assessment, 21*(1), 108-118.

Richards, J. M., & Gross, J. J. (1999). Composure at any cost? The cognitive consequences of emotion suppression. *Personality and Social Psychology Bulletin, 25*(8), 1033-1044.

Richards, J. M., & Gross, J. J. (2000). Emotion regulation and memory: the cognitive costs of keeping one's cool. *Journal of Personality and Social Psychology, 79*(3), 410-424. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10981843

Robins, C. J., Ivanoff, A. M., & Linehan, M. M. (2001). Dialectical behavior therapy. *Handbook of personality disorders: Theory, Research, and Treatment*, 437-459.

Roemer, L., & Borkovec, T. D. (1994). Effects of suppressing thoughts about emotional material. *Journal of Abnormal Psychology, 103*(3), 467.

Roth, S., & Cohen, L. J. (1986). Approach, avoidance, and coping with stress. *American Psychologist, 41*(7), 813-819. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/3740641

Rottenberg, J., Kasch, K. L., Gross, J. J., & Gotlib, I. H. (2002). Sadness and amusement reactivity differentially predict concurrent and prospective functioning in major depressive disorder. *Emotion, 2*(2), 135.

Salters-Pedneault, K., Roemer, L., Tull, M. T., Rucker, L., & Mennin, D. S. (2006). Evidence of broad deficits in emotion regulation associated with chronic worry and generalized anxiety disorder. *Cognitive Therapy and Research, 30*(4), 469-480.

Schmidt, N. B., Richey, J. A., Buckner, J. D., & Timpano, K. R. (2009). Attention training for generalized social anxiety disorder. *Journal of Abnormal Psychology, 118*(1), 5.

Seery, M. D., Silver, R. C., Holman, E. A., Ence, W. A., & Chu, T. Q. (2008). Expressing thoughts and feelings following a collective trauma: immediate responses to 9/11 predict

negative outcomes in a national sample. *Journal of Consulting and Clinical Psychology*, *76*(4), 657.

Sévigny, M.-C., Everett, J., & Grondin, S. (2003). Depression, attention, and time estimation. *Brain and Cognition, 53*(2), 351-353.

Sheppes, G., & Gross, J. J. (2012). Emotion regulation effectiveness: what works when. *Handbook of Psychology*, 391-406.

Sheppes, G., & Meiran, N. (2007). Better late than never? On the dynamics of online regulation of sadness using distraction and cognitive reappraisal. *Personality and Social Psychological Bulletin, 33*(11), 1518-1532. doi:10.1177/0146167207305537

Sheppes, G., & Meiran, N. (2008). Divergent cognitive costs for online forms of reappraisal and distraction. *Emotion, 8*(6), 870-874. doi:10.1037/a0013711

Sheppes, G., Scheibe, S., Suri, G., & Gross, J. J. (2011). Emotion-regulation choice. *Psychological Science, 22*(11), 1391-1396. doi:10.1177/0956797611418350

Slee, N., Spinhoven, P., Garnefski, N., & Arensman, E. (2008). Emotion regulation as mediator of treatment outcome in therapy for deliberate self-harm. *Clinical Psychology & Psychotherapy, 15*(4), 205.

Sloan, D. M. (2004). Emotion regulation in action: emotional reactivity in experiential avoidance. *Behaviour Research and Therapy, 42*(11), 1257-1270. doi:10.1016/j.brat.2003.08.006

Smeets, E., Roefs, A., van Furth, E., & Jansen, A. (2008). Attentional bias for body and food in eating disorders: Increased distraction, speeded detection, or both? *Behaviour Research and Therapy, 46*(2), 229-238.

Smyth, J. M., & Arigo, D. (2009). Recent evidence supports emotion-regulation interventions for improving health in at-risk and clinical populations. *Current Opinion in Psychiatry, 22*(2), 205-210.

Spielberger, C., Gorsuch, R. L., Lushene, R., Vagg, P., & Jacobs, G. (1983). *Manual for the State-Trait Anxiety Scale*. Palo Alto, CA: Consulting Psychologists

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. (1970). *The State-Trait Anxiety Inventory (Test Manual)*. Palo Alto, CA: Consulting Psychologists.

Spira, A. P., Zvolensky, M. J., Eifert, G. H., & Feldner, M. T. (2004). Avoidance-oriented coping as a predictor of panic-related distress: a test using biological challenge. *Journal of Anxiety Disorders, 18*(3), 309-323. doi:http://dx.doi.org/10.1016/S0887-6185(02)00249-9

Stallings, G., Hand, D., Albright, H., Behn, P., Davis, T., Dugan, D., . . . (Firm), B. V. H. E. (2011). Bambi. Burback, CA: Walt Disney Studioes Home Entertainment.

Stanley, B., Brown, G., Brent, D. A., Wells, K., Poling, K., Curry, J., . . . Klomek, A. B. (2009). Cognitive-behavioral therapy for suicide prevention (CBT-SP): Treatment model, feasibility, and acceptability. *Journal of the American Academy of Child & Adolescent Psychiatry, 48*(10), 1005-1013.

Stordal, K. I., Lundervold, A. J., Egeland, J., Mykletun, A., Asbjornsen, A., Landro, N. I., . . . Lund, A. (2004). Impairment across executive functions in recurrent major depression. *Nordic Journal of Psychiatry, 58*(1), 41-47. doi:10.1080/08039480310000789

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology, 18*(6), 643.

Strunk, K. K., Sutton, G. W., & Skadeland, D. R. (2010). Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) may be valid in men ages 18 to 20. *Psychological Reports, 107*(2), 493-499.

Sutherland, G., Newman, B., & Rachman, S. (1982). Experimental investigations of the relations between mood and intrusive unwanted cognitions. *British Journal of Medical Psychology, 55*(2), 127-138.

Suveg, C., Kendall, P. C., Comer, J. S., & Robin, J. (2006). Emotion-focused cognitive-behavioral therapy for anxious youth: A multiple-baseline evaluation. *Journal of Contemporary Psychotherapy, 36*(2), 77-85.

Suveg, C., Sood, E., Comer, J. S., & Kendall, P. C. (2009). Changes in emotion regulation following cognitive-behavioral therapy for anxious youth. *Journal of Clinical Child & Adolescent Psychology, 38*(3), 390-401.

Szasz, P. L., Szentagotai, A., & Hofmann, S. G. (2011). The effect of emotion regulation strategies on anger. *Behaviour Research and Therapy, 49*(2), 114-119.

Tang, Y.-Y., Ma, Y., Fan, Y., Feng, H., Wang, J., Feng, S., . . . Fan, M. (2009). Central and autonomic nervous system interaction is altered by short-term meditation. *Proceedings of the National Academy of Sciences, 106*(22), 8865-8870. doi:10.1073/pnas.0904031106

Tarrier, N. (2010). Broad minded affective coping (BMAC): A "positive" CBT approach to facilitating positive emotions. *International Journal of Cognitive Therapy, 3*(1), 64-76.

Teasdale, J. D. (1999). Emotional processing, three modes of mind and the prevention of relapse in depression. *Behaviour Research and Therapy, 37 Suppl 1*, S53-77. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/10402696

Teasdale, J. D. (1999). Emotional processing, three modes of mind and the prevention of relapse in depression. *Behaviour Research and Therapy, 37,* S53-S77.

Teasdale, J. D., Segal, Z., & Williams, J. M. G. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? *Behaviour Research and Therapy, 33*(1), 25-39.

Thiruchselvam, R., Blechert, J., Sheppes, G., Rydstrom, A., & Gross, J. J. (2011). The temporal dynamics of emotion regulation: an EEG study of distraction and reappraisal. *Biological Psychology, 87*(1), 84-92. doi:10.1016/j.biopsycho.2011.02.009

Thiruchselvam, R., Hajcak, G., & Gross, J. J. (2012). Looking inward: shifting attention within working memory representations alters emotional responses. *Psychological Science, 23*(12), 1461-1466. doi:10.1177/0956797612449838

Thompson, R. A. (1991). Emotional regulation and emotional development. *Educational Psychology Review, 3*(4), 269-307.

Thompson, R. A. (1994). Emotion regulation: a theme in search of definition. *Monographs of the Society for Research in Child Development, 59*(2-3), 25-52. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/7984164

Thompson, R. F., & Spencer, W. A. (1966). Habituation: a model phenomenon for the study of neuronal substrates of behavior. *Psychological Review, 73*(1), 16.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research, 27*(3), 247-259.

Tsourtos, G., Thompson, J., & Stough, C. (2002). Evidence of an early information processing speed deficit in unipolar major depression. *Psychological Medicine, 32*(02), 259-265.

Vaillant, G. E. (1992). *Ego Mechanisms of Defense: A Guide for Clinicans and Researchers*. Washington, DC: American Psychiatric Press.

Wadlinger, H. A. (2009). *Looking on the bright side: The effect of a positive visual attention training intervention on attention and emotion regulation.* (Dissertation), Brandeis University, Ann Arbor.

Wadlinger, H. A., & Isaacowitz, D. M. (2011). Fixing our focus: Training attention to regulate emotion. *Personality and Social Psychology Review, 15*(1), 75-102

Wahl, K., Huelle, J. O., Zurowski, B., & Kordon, A. (2013). Managing obsessive thoughts during brief exposure: An experimental study comparing mindfulness-based strategies and distraction in obsessive–compulsive disorder. *Cognitive Therapy and Research, 37*(4), 752-761.

Walter, H., von Kalckreuth, A., Schardt, D., Stephan, A., Goschke, T., & Erk, S. (2009). The temporal dynamics of voluntary emotion regulation. *PLoS One, 4*(8), e6726. doi:10.1371/journal.pone.0006726

Watkins, E., Teasdale, J., & Williams, R. (2000). Decentring and distraction reduce overgeneral autobiographical memory in depression. *Psychological Medicine, 30*(04), 911-920.

Wechsler, D. (2008). *Wechsler Adult Intelligence Scale–Fourth Edition (WAIS–IV)*. San Antonio, TX: Pearson Assessment.

Wechsler, D. (2008). *Wechsler Adult Intelligence Scale - Fourth Edition: Technical and Interpretive Manual*. San Antonio, TX: Pearson Assessment.

Wegner, D. M., & Gold, D. B. (1995). Fanning old flames: Emotional and cognitive effects of suppressing thoughts of a past relationship. *Journal of Personality and Social*

Psychology, 68(5), 782-792. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/7776182

Wegner, D. M., Schneider, D. J., Carter, S. R., 3rd, & White, T. L. (1987). Paradoxical effects of thought suppression. *Journal of Personality and Social Psychology, 53*(1), 5-13. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/3612492

Wegner, D. M., & Zanakos, S. (1994). Chronic thought suppression. *Journal of Personality, 62*(4), 615-640.

Wenzlaff, R. M., & Bates, D. E. (1998). Unmasking a cognitive vulnerability to depression: how lapses in mental control reveal depressive thinking. *Journal of Personality and Social Psychology, 75*(6), 1559.

Wenzlaff, R. M., Wegner, D. M., & Roper, D. W. (1988). Depression and mental control: the resurgence of unwanted negative thoughts. *Journal of Personality and Social Psychology, 55*(6), 882.

Whelton, W. J. (2004). Emotional processes in psychotherapy: Evidence across therapeutic modalities. *Clinical Psychology & Psychotherapy, 11*(1), 58-71.

Williams, J. M. G., Mathews, A., & MacLeod, C. (1996). The emotional Stroop task and psychopathology. *Psychological Bulletin, 120*(1), 3.

Wilson, G. T. (1996). Acceptance and change in the treatment of eating disorders and obesity. *Behavior Therapy, 27*(3), 417-439.

Wilson, T. D., & Gilbert, D. T. (2008). Explaining Away: A Model of Affective Adaptation. *Perspectives on Psychological Science, 3*(5), 370-386. doi:10.1111/j.1745-6924.2008.00085.x

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: evidence of brief mental training. *Consciousness & Cognition, 19*(2), 597-605. doi:10.1016/j.concog.2010.03.014

Zeidan, F., Johnson, S. K., Gordon, N. S., & Goolkasian, P. (2010). Effects of brief and sham mindfulness meditation on mood and cardiovascular variables. *Journal of Alternative and Complementary Medicine, 16*(8), 867-873. doi:10.1089/acm.2009.0321

APPENDIX

Table 1. *Participant Characteristics as a Function of Treatment Condition.*

Characteristic	Mindfulness condition (n = 25)	Distraction condition (n = 25)	No-instruction condition (n=25)
Age	19.2 years (*SD* = 1.21)	19.1 years (*SD* = 0.91)	18.9 years (*SD* = 1.04)
Gender			
Male	13 (52%)	15 (60%)	8 (32%)
Female	12 (48%)	10 (40%)	17 (68%)
Ethnicity/Race			
White/Caucasian	18 (72%)	18 (72%)	21 (84%)
Black/African-American	3 (12%)	3 (12%)	0 (0%)
Hispanic/Latino	0 (0%)	1 (4%)	0 (0%)
Asian-American	1 (4%)	2 (8%)	4 (16%)
Indian/Middle-Eastern	1 (4%)	0 (0%)	0 (0%)
Mixed Race/Ethnicity	2 (8%)	1 (4%)	0 (0%)
Relationship Status			
Single	11 (44%)	18 (72%)	14 (56%)
Dating	14 (56%)	7 (28%)	11 (44%)
Sexual Orientation			
Heterosexual	23 (92%)	24 (96%)	23 (92%)
Gay	1 (4%)	1 (4%)	1 (4%)
Lesbian	0 (0%)	0 (0%)	0 (0%)
Bisexual	1 (4%)	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)	1 (4%)
Education Level	12.7 years (*SD* = 0.98)	12.5 years (*SD* = 0.82)	12.6 years (*SD* = 0.92)
Grade Point Average			
1.0-1.5	0 (0%)	0 (0%)	0 (0%)
1.5-2.0	0 (0%)	0 (0%)	1 (4%)
2.0-2.5	1 (4%)	1 (4%)	2 (8%)
2.5-3.0	5 (20%)	8 (32%)	3 (12%)
3.0-3.5	7 (28%)	7 (28%)	9 (36%)
3.5-4.0	11 (44%)	9 (36%)	10 (40%)
Religion			
Catholic	4 (16%)	2 (8%)	1 (3%)
Non-Catholic/Christian	18 (72%)	18 (72%)	33 (87%)
Buddhist	0 (0%)	0 (0%)	1 (4%)
Hindu	1 (4%)	0 (0%)	1 (4%)
Atheist/Agnostic	2 (8%)	4 (16%)	2 (8%)
Other	0 (0%)	1 (4%)	0 (0%)

Table 1. *Continued.*

Characteristic	Mindfulness condition (n = 25)	Distraction condition (n = 25)	No-instruction condition (n=25)
Family Income			
Less than $20,000	2 (8%)	2 (8%)	1 (4%)
$20,000-40,000	2 (8%)	3 (11%)	3 (12%)
$40,000-60,000	4 (16%)	4 (16%)	0 (0%)
$60,000-80,000	4 (16%)	5 (20%)	3 (12%)
$80,000-100,000	3 (12%)	2 (8%)	4 (16%)
More than $100,000	10 (40%)	9 (36%)	13 (52%)
Living Situation			
Alone off campus	1 (4%)	1 (4%)	1 (4%)
Alone on campus	0 (0%)	2 (8%)	1 (4%)
One roommate	14 (56%)	11 (44%)	17 (68%)
Two roommates	1 (4%)	2 (8%)	2 (8%)
Three roommates	7 (28%)	9 (36%)	4 (16%)
Four roommates	1 (4%)	0 (0%)	0 (0%)
More than four roommates	1 (4%)	0 (0%)	0 (0%)
Pre-Test Sadness	9.8 (*SD* = 14.10)	19.8 (*SD* = 18.36)	6.6 (*SD* = 12.16)
Pre-Test Happiness	75.4 (*SD* = 16.30)	64.0 (*SD* = 16.79)	69.2 (*SD* = 24.03)
Pre-Test Anxiety	30.4 (*SD* = 26.87)	34.5 (*SD* = 25.33)	26.2 (*SD* = 28.70)
BDI-II	3.4 (*SD* = 2.96)	3.9 (*SD* = 3.52)	4.6 (*SD* = 3.59)
STAI	33.9 (*SD* = 5.66)	36.0 (*SD* = 6.09)	35.5 (*SD* = 7.13)
BAARS-IV	38.4 (*SD* = 5.84)	39.7 (*SD* = 6.77)	40.5 (*SD* = 10.23)
DERS	64.8 (*SD* = 15.70)	67.8 (*SD* = 12.45)	67.7 (*SD* = 20.9)
Familiarity with *Bambi* Film			
Not at all familiar	0 (0%)	2 (8%)	3 (12%)
A little familiar	6 (24%)	6 (24%)	6 (24%)
Somewhat familiar	7 (28%)	7 (28%)	8 (32%)
Very familiar	12 (48%)	8 (32%)	8 (32%)

Table 1. *Continued.*

Characteristic	Mindfulness condition (n = 25)	Distraction condition (n = 25)	No-instruction condition (n=25)
Familiarity with *Champ* Film			
Not at all familiar	22 (88%)	23 (92%)	23 (92%)
A little familiar	3 (12%)	0 (0%)	1 (4%)
Somewhat familiar	0 (0%)	0 (0%)	1 (4%)
Very familiar	0 (0%)	0 (0%)	0 (0%)
Familiarity with mindfulness			
Not at all familiar	16 (64%)	14 (56%)	13 (52%)
A little familiar	6 (24%)	4 (16%)	7 (28%)
Somewhat familiar	2 (8%)	4 (16%)	4 (16%)
Very familiar	1 (4%)	1 (4%)	1 (4%)
Familiarity with distraction			
Not at all familiar	13 (52%)	11 (44%)	13 (52%)
A little familiar	6 (24%)	6 (24%)	5 (20%)
Somewhat familiar	4 (16%)	4 (16%)	4 (16%)
Very familiar	2 (8%)	2 (8%)	0 (0%)

Note. Pre-Test Sadness = Visual analog rating of sadness (range: 0-100; higher score indicates greater sadness), Pre-Test Happiness = Visual analog rating of happiness (range: 0-100; higher score indicates greater happiness), Pre-Test Anxiety = Visual analog rating of anxiety (range: 0-100; higher score indicates greater anxiety), BDI-II = Beck Depression Inventory, 2nd Edition, STAI = State-Trait Anxiety Inventory, Trait Subscale, BAARS-IV = Barkley Adult ADHD Rating Scale, 4th Edition, DERS = Difficulties in Emotion Regulation Scale.

Table 2. *Participant Behavior Observations as a Function of Treatment Condition.*

	Mindfulness condition (n = 25)	Distraction condition (n = 25)	No-instruction condition (n=25)
During First Training			
Interference Behaviors	*M* = 0.4 (*SD* = .65)	*M* = 0.4 (*SD* = .71)	*M* = 0.9 (*SD* = 1.55)
Off-Task Behaviors	*M* = 0.7 (*SD* = 1.06)	*M* = 0.9 (*SD* = 1.71)	*M* = 1.2 (*SD* = 1.80)
Motor Movement:			
Normal activity level	19 (76%)	20 (80%)	16 (64%)
Shifts position frequently	6 (24%)	4 (16%)	9 (36%)
Slowed motor activity	0 (0%)	1 (4%)	0 (0%)
Energy Level:			
Alert	23 (92%)	20 (80%)	20 (80%)
Fatigued/poor endurance	2 (8%)	3 (12%)	4 (16%)
Overactive/impulsive	0 (0%)	1 (4%)	1 (4%)
Attention:			
Maintains full attention	19 (76%)	18 (72%)	16 (64%)
Needs 1 redirection	6 (24%)	5 (20%)	3 (12%)
Needs 2 redirections	0 (0%)	2 (8%)	5 (20%)
Fully inattentive	0 (0%)	0 (0%)	1 (4%)
During First Film			
Interference Behaviors	*M* = 0.0 (*SD* = .20)	*M* = 0.0 (*SD* = .00)	*M* = 0.0 (*SD* = .20)
Off-Task Behaviors	*M* = 0.0 (*SD* = .00)	*M* = 0.0 (*SD* = .20)	*M* = 0.0 (*SD* = .20)
Motor Movement:			
Normal activity level	22 (88%)	25 (100%)	25 (100%)
Shifts position frequently	2 (8%)	0 (0%)	0 (0%)
Slowed motor activity	1 (4%)	0 (0%)	0 (0%)
Energy Level:			
Alert	23 (92%)	24 (96%)	24 (96%)
Fatigued/poor endurance	2 (8%)	1 (4%)	1 (4%)
Overactive/impulsive	1 (4%)	0 (0%)	0 (0%)
Attention:			
Maintains full attention	24 (96%)	23 (92%)	25 (100%)
Needs 1 redirection	0 (0%)	1 (4%)	0 (0%)
Needs 2 redirections	0 (0%)	0 (0%)	0 (0%)
Fully inattentive	1 (4%)	0 (0%)	0 (0%)

Table 2. *Continued.*

	Mindfulness condition (n = 25)	Distraction condition (n = 25)	No-instruction condition (n=25)
During Second Training			
Interference Behaviors	*M* = 0.2 (*SD* = .50)	*M* = 0.8 (*SD* = 1.08)	*M* = 0.4 (*SD* = 1.12)
Off-Task Behaviors	*M* = 0.8 (*SD* = 1.08)	*M* = 0.8 (*SD* = 1.56)	*M* = 1.2 (*SD* = 2.53)
Motor Movement:			
Normal activity level	17 (71%)	19 (76%)	22 (88%)
Shifts position frequently	6 (25%)	6 (24%)	3 (12%)
Slowed motor activity	1 (4%)	0 (0%)	0 (0%)
Energy Level:			
Alert	21 (84%)	18 (72%)	19 (76%)
Fatigued/poor endurance	3 (12%)	6 (24%)	4 (16%)
Overactive/impulsive	0 (0%)	1 (4%)	1 (4%)
Attention:			
Maintains full attention	19 (76%)	20 (80%)	19 (76%)
Needs 1 redirection	3 (12%)	3 (12%)	1 (4%)
Needs 2 redirections	0 (0%)	0 (0%)	0 (0%)
Fully inattentive	2 (8%)	2 (8%)	4 (16%)
During Target Film			
Interference Behaviors	*M* = 0.0 (*SD* = .00)	*M* = 0.0 (*SD* = .20)	*M* = 0.0 (*SD* = .20)
Off-Task Behaviors	*M* = 0.0 (*SD* = .00)	*M* = 0.1 (*SD* = .28)	*M* = 0.0 (*SD* = .20)
Motor Movement:			
Normal activity level	23 (92%)	24 (96%)	24 (96%)
Shifts position frequently	1 (4%)	1 (4%)	1 (4%)
Slowed motor activity	1 (4%)	0 (0%)	0 (0%)
Energy Level:			
Alert	24 (96%)	23 (92%)	24 (96%)
Fatigued/poor endurance	1 (4%)	2 (8%)	1 (4%)
Overactive/impulsive	0 (0%)	0 (0%)	0 (0%)
Attention:			
Maintains full attention	24 (96%)	24 (96%)	24 (96%)
Needs 1 redirection	0 (0%)	0 (0%)	1 (4%)
Needs 2 redirections	0 (0%)	1 (4%)	0 (0%)
Fully inattentive	1 (4%)	0 (0%)	0 (0%)

Table 5. *Correlations and Descriptive Data for Self-Report Instruments.*

Instrument	1	2	3	4	5	6	7	*M*	*SD*
1. Pre-Sad	---	-.46**	.44**	.32**	.35**	.24*	.30**	11.8	15.82
2. Pre-Hap		---	-.28*	-.40**	-.52**	-.25*	-.53**	69.6	19.67
3. Pre-Anx			---	.33**	.47**	.37**	.46**	30.4	26.86
4. BDI-II				---	.64**	.38**	.43**	4.0	3.36
5. STAI					---	.61**	.63**	35.1	6.30
6. BAARS						---	.40**	39.5	7.79
7. DERS							---	66.8	16.56

Note. Pre-Sad = Visual analog rating of sadness (range: 0-100; higher score indicates greater sadness), Pre-Happy = Visual analog rating of happiness (range: 0-100; higher score indicates greater happiness), Pre-Anx = Visual analog rating of anxiety (range: 0-100; higher score indicates greater anxiety), BDI-II = Beck Depression Inventory, 2nd Edition, STAI = State-Trait Anxiety Inventory, Trait Subscale, BAARS-IV = Barkley Adult ADHD Rating Scale, 4th Edition, DERS = Difficulties in Emotion Regulation Scale.

* Correlation significant at the 0.05 level.

** Correlation significant at the 0.01 level.

Table 6. *Mood Ratings Across Time.*

Time Point	Sadness *M (SD)*	Happiness *M (SD)*	Anxiety *M (SD)*
Pre-Test	11.8 (15.82)	69.6 (19.67)	30.4 (26.9)
Mid-Film Induction	34.8 (24.56)	55.4 (20.12)	24.3 (24.20)
Post-Film Induction	43.3 (28.50)	51.5 (24.23)	24.1 (24.73)
Post-Cognitive Battery	17.6 (17.83)	64.2 (20.85)	32.4 (27.49)

Table 7. *Descriptive Data for Cognitive Battery.*

Test/Subscores	*M (SD)*
Continuous Performance Test	
Correct Detections (%)	94.5 (4.94)
Omission Errors (%)	5.5 (4.94)
Commission Errors (%)	1.4 (1.59)
Perseverative Commission Errors (%)	0.2 (1.04)
Delayed Omission Errors (%)	0.0 (0.00)
Delayed Repetition Errors (%)	3.2 (3.84)
Correct Detections (MSec)	482.8 (64.0)
Commission Errors (MSec)	342.3 (132.7)
Perseverative Commission Errors (MSec)	49.4 (149.45)
Delayed Omission Errors (MSec)	0.0 (0.00)
Delayed Repetition Errors (MSec)	231.9 (225.67)
Emotional Stroop Task	
Word Reading	
Total Time	43.5 (7.90)
Total Errors	0.1 (0.23)
Self-Corrections	0.5 (0.92)
Color Naming	
Total Time	56.9 (10.46)
Total Errors	0.2 (.40)
Self-Corrections	0.7 (0.82)
Stroop Task	
Total Time	91.7 (23.38)
Total Errors	0.7 (1.06)
Self-Corrections	1.7 (1.61)
Neutral Card	
Total Time	69.4 (14.89)
Total Errors	0.2 (0.46)
Self-Corrections	0.6 (0.85)
Depressive Card	
Total Time	76.0 (17.33)
Total Errors	0.2 (0.57)
Self-Corrections	0.8 (0.92)
Coding	
Raw Score	54.8 (8.18)
Scaled Score	10.3 (2.69)

Table 8. *Descriptive Data for Cognitive Battery by Condition.*

Test/Subscores	Mindfulness *M (SD)*	Distraction *M (SD)*	No-Instruction *M (SD)*
Continuous Performance Test			
Correct Detections (%)	95.5 (4.28)	94.7 (3.17)	93.5 (6.68)
Omission Errors (%)	4.5 (4.28)	5.4 (3.17)	6.5 (6.68)
Commission Errors (%)	1.3 (0.99)	1.7 (2.15)	1.32 (1.44)
Perseverative Commission Errors (%)	0.0 (0.11)	0.5 (1.77)	0.1 (0.25)
Delayed Omission Errors (%)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
Delayed Repetition Errors (%)	3.4 (2.82)	3.7 (5.24)	2.4 (3.00)
Correct Detections (MSec)	473.4 (56.27)	480.6 (58.07)	494.4 (76.41)
Commission Errors (MSec)	355.9 (125.89)	341.4 (116.34)	329.5 (156.63)
Perseverative Commission Errors (MSec)	10.0 (49.80)	103.0 (215.78)	35.3 (122.5)
Delayed Omission Errors (MSec)	0.0 (0.00)	0.0 (0.00)	0.0 (0.00)
Delayed Repetition Errors (MSec)	299.2 (220.15)	209.0 (213.12)	187.6 (236.30)
Emotional Stroop Task			
Word Reading			
Total Time	43.3 (7.96)	42.3 (5.96)	44.9 (9.56)
Total Errors	0.0 (0.00)	0.0 (0.20)	0.1 (0.33)
Self-Corrections	0.5 (0.92)	0.4 (1.04)	0.6 (0.81)
Color Naming			
Total Time	56.0 (11.65)	57.8 (8.93)	56.8 (10.98)
Total Errors	0.2 (0.52)	0.1 (0.33)	0.1 (0.33)
Self-Corrections	0.5 (0.51)	0.8 (0.99)	0.8 (0.85)
Stroop Task			
Total Time	91.0 (24.34)	90.7 (17.51)	93.3 (27.97)
Total Errors	0.4 (0.71)	0.9 (1.54)	0.7 (0.69)
Self-Corrections	1.5 (1.19)	1.7 (1.51)	2.0 (2.02)
Neutral Card			
Total Time	69.8 (14.79)	69.1 (9.79)	69.5 (19.20)
Total Errors	0.2 (0.37)	0.2 (0.52)	0.2 (0.47)
Self-Corrections	0.6 (0.82)	0.6 (0.87)	0.6 (0.91)
Depressive Card			
Total Time	74.5 (13.78)	76.4 (10.19)	77.1 (25.06)
Total Errors	0.1 (0.44)	0.3 (0.84)	0.1 (0.28)
Self-Corrections	0.5 (0.77)	1.0 (0.89)	0.8 (1.03)
Coding			
Raw Score	53.9 (8.21)	55.2 (8.79)	55.2 (7.77)
Scaled Score	9.9 (2.91)	10.3 (2.62)	10.8 (2.57)

Table 9. *Correlations Among Self-Report Instruments and Cognitive Battery Scores.*

Task/ Subtest	BDI-II	BAARS	STAI	DERS	Pre-Sad	Pre-Happy	Pre-Anx
CPT							
CorrDetect (%)	-.05	-.24*	-.09	-.06	-.18	.00	-.23*
OmErr (%)	.05	.24*	.09	.06	.18	.00	.22*
ComErr (%)	-.03	.05	.00	.04	.16	-.04	.19
PersComErr (%)	-.06	.00	-.03	-.02	.05	-.01	.05
DelOmErr (%)	.00	.00	.00	.00	.00	.00	.00
DelRepErr (%)	-.09	.10	.06	.05	.30*	-.02	.18
CorrDetect (MS)	-.07	.01	-.11	-.11	-.08	.21	-.22
ComErr (MS)	-.04	.10	-.07	.09	.14	-.05	-.06
PersComErr (MS)	.14	-.09	.05	.04	.12	-.08	.03
DelOmErr (MS)	.00	.00	.00	.00	.00	.00	.00
DelRepErr (MS)	.01	.14	.12	-.02	.20	.10	.14
Emotional Stroop							
Word Reading							
Total Time	-.11	.10	.01	.17	-.02	-.07	.25*
Total Errors	-.02	-.18	-.06	-.08	-.14	-.12	-.24*
Self-Corrections	.18	-.10	.01	.08	-.03	.13	.05
Color Naming							
Total Time	.02	.10	.03	.15	.25*	-.07	.26*
Total Errors	.02	-.10	.02	-.12	.04	-.15	-.08
Self-Corrections	.28*	.02	.28*	.15	.30**	-.13	.12
Stroop Task							
Total Time	-.03	.16	.02	.14	.28*	.02	.25*
Total Errors	-.04	-.05	-.03	-.02	-.10	.12	-.10
Self-Corrections	.02	-.11	-.07	-.05	.18	-.02	.15
Neutral Card							
Total Time	.03	-.03	.01	.17	.27*	-.10	.26*
Total Errors	.08	-.03	.03	.06	.10	-.01	.08
Self-Corrections	.13	-.01	.09	.06	-.03	-.10	.07
Depressive Card							
Total Time	.04	-.04	.05	.27*	.34**	-.12	.26*
Total Errors	.28*	-.10	.02	.09	.17	-.07	.04
Self-Corrections	.07	-.07	.01	.10	.12	.02	-.02
Coding							
Raw Score	-.01	.05	-.10	-.01	-.21	.09	-.10
Scaled Score	.00	.05	-.07	.00	-.22	.08	-.14

Note. CPT = Continuous Performance Task, CorrDetect = Correct Detections, OmErr = Omission Errors, ComErr = Commission Errors, PersComErr = Perseverative Commission Errors, DelOmErr = Delayed Omission Errors, DelRepErr = Delayed Repetition Errors, Pre-Sad = Visual analog rating of sadness, Pre-Happy = Visual analog rating of happiness, Pre-Anx = Visual analog rating of anxiety, BDI-II = Beck Depression Inventory, 2nd Edition, STAI = State-Trait Anxiety Inventory, Trait Subscale, BAARS-IV = Barkley Adult ADHD Rating Scale, 4th Edition, DERS = Difficulties in Emotion Regulation Scale.
* Correlation significant at the 0.05 level.
** Correlation significant at the 0.01 level.

VITA

Kerry Margaret Cannity was born in Raleigh, N.C., to parents Richard and Marjorie Cannity. She has one younger brother, Jeffrey. She attended Mary P. Douglas Creative Arts and Science Magnet Elementary and Emma Conn Active Learning and Technology Magnet Elementary School. Following, she matriculated to John W. Ligon GT Magnet Middle School and continued to William G. Enloe High School, which is perennially ranked in Newsweek's Top 50 Schools and has been rated the top Magnet High School in the Nation by the Magnet Schools Association (2000). It was at Enloe High that Ms. Cannity excelled in her first psychology class and embarked on a course of study which would become both a passion and a lifelong pursuit of knowledge.

After graduation, Ms. Cannity attended the University of North Carolina at Chapel Hill, N.C., a school consistently ranked in the U.S. News and World Report's top universities. At the University of North Carolina, she completed Bachelor of Arts degrees in Psychology and Journalism and Mass Communication in May 2008, in addition to participating in music and club lacrosse. She also attended an international study abroad program at the University of Canterbury in Christchurch, New Zealand, which afforded her the chance to both travel and immerse herself in the educational opportunities and culture of the country.

Following college, she worked as a Resident Patient Assistant at a residential treatment facility for women with eating disorders and as a Neuropsychological Assistant and Psychological Technician at North Carolina Neuropsychiatry, assisting with psychological assessments. In 2011, Ms. Cannity accepted a position in the Clinical Psychology doctoral program at the University of Tennessee at Knoxville, T.N., to work with Derek R. Hopko, Ph.D.

Ms. Cannity graduated with a Masters of Arts degree in Psychology in December 2013. During her time at the University of Tennessee, she completed clinical and research opportunities at the Knoxville Family Justice Center, the Helen Ross McNabb Crisis Stabilization Unit, and the University of Tennessee Medical Center Cancer Institute. In June 2016, she completed her dissertation project under the supervision of Jennifer Bolden, Ph.D. She currently is completing her pre-doctoral internship at Denver Health Medical Center in Denver, Colorado.