

IS MINDFULNESS JUST ANOTHER EGO DEPLETION EXERCISE?

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Given increasing interest in the therapeutic benefits of mindfulness, limitations of its treatment utility are frequently questioned. As such, the purpose of the study was to examine the effects of mindfulness on a subsequent self-control task in a sample of college students. A total of 67 participants were randomly assigned to one of three conditions: a control condition, an experimental mindfulness-only condition or a comparison expectancy-plus-mindfulness condition to investigate the utility of mindfulness practice when motivated by an outcome of increased self-control. Results did not indicate a difference in persistence on a difficult task between conditions, regardless of the manipulation. Conceptual and experimental limitations of current study's findings, as well as future directions, are discussed.

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CHAPTER 1

INTRODUCTION

The desire for increased self-control and willpower is dominant in America. As an individualistic culture, value is placed on ability, self-achievement, and production (Kitayama, Conway, Pietromonaco, Park, & Plaut, 2010). The American Psychological Association's annual Stress in America survey found that 27% of Americans believe lack of willpower to be the largest barrier to behavioral change (2011). The need for sustained vigilance and effective output leads individuals to seek out simple and effective means to continue performing at their best. A growing trend is the consumption of large quantities of energy drinks; the average American consumes 1.2 gallons per year as demonstrated in a 2010 survey, compared to 0.5 gallons five years prior (Zmuda, 2011). In fact, Molden et al. (2012) found that even rinsing one's mouth with an energy drink has motivational implications for increased self-control.

Lasting solutions to increase self-achievement are also sought. For example, a large volume of self-help books have been written in response to the perception that it is important to control emotions and engage in extended outcome-oriented behavior. A search for books by American writers using key words "self-help" and "control" on WorldCat.com brought up 6,502 results. A common topic among these titles is one of diet and exercise. In the general community, the use of dietary supplements to expedite goal weights and the use of maladaptive eating behaviors in an effort to obtain command of weight each have a long history with self-control (Conner, Kirk, Cade, & Barrett, 2001; Rezek, 1991).

The increased use of prescription medications to treat attention deficit hyperactivity disorder (ADHD) symptoms, an area of much dispute, may help illustrate the need for a solution to staying on task and handling distractions (McCabe, Cranford, Teter, Rabiner, & Boyd, 2012).

Moreover, the off-prescription use of these same chemicals by college students is on the rise (McCabe et al., 2012). Productivity was the reason most commonly endorsed for use of non-prescribed ADHD medication (Novak, Kroutil, Williams, & van Brunt; 2007). ADHD is related to deficits in tasks related to executive functioning, including response inhibition, attention, and working memory (Rubia, 2010; Rubia et al., 2001; Seidman, 2006; Weijer-Bergsma, Formsa, Bruin, & Bögels, 2012). In order to address these deficits, mindfulness training was found to reduce attention and behavioral problems, and improve executive functioning in adolescents (Weijer-Bergsma et al., 2012); and adults (Zylowska et al., 2008).

Mindfulness' increased Western popularity has led to its introduction into empirically supported therapies; however, this focus has never been in the context of self-control research and it has not been with the ambition of increasing one's self-regulatory abilities. Mindfulness techniques have been proposed as a method for increasing self-control once an individual has been depleted of their self-control resources. This preliminary evidence, however, should be further explored to identify the limitations (Friese, Messner, & Schaffner, 2012). Competing research suggests that mindfulness may function as a self-regulatory process, requiring an effortful awareness of both internal and external stimuli (Bishop et al., 2004). This may suggest mindfulness can exhaust as well as replenish self-control resources. If mindfulness is expected to increase self-control, would engaging in mindfulness practices always serve as beneficial? It is also unclear whether mindfulness would still "work" if it were used solely for the motivation of increasing self-control. This specific question has not been answered before, as mindfulness is typically described as an experience free of expectations (Hayes, Strosahl, & Wilson, 1999). The current study proposes that mindfulness, with the expectation of increased self-control, may instead function to decrease self-control.

The concern at hand is if whether using mindfulness practice to counter self-control is always useful, or if suppressing natural responses to avoid discomfort is problematic. Suppression has been found to be cognitively costly and yield more of the distress one wished to avoid (John & Gross, 2004). Cognitive effort, in attempting to suppress a thought, shows paradoxical effects, rendering those thoughts more persistent (Wegner, Schneider, Carter, & White, 1987). Avoidant coping (strategic attempts to escape stressful experiences) is a component of experiential avoidance (Kashdan, Barrios, Forsyth, & Steger, 2006). Experiential avoidance is the engagement in avoidant behaviors to resist or control private events (e.g., thoughts, feelings, bodily sensations; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Oftentimes controlling private experiences can be useful (e.g., attempting to hide anxiety during presentations); however, Kashdan and colleagues explain the process becomes problematic when controlling is applied rigidly, inflexibly, and excessively – especially when it gets in the way of living one’s life in a valued way (2006).

Self-control

From a cognitive tradition, the role of the self is to be in control of overt behavior and private processes, like thinking and feeling; therefore, the self must expend itself to exert control (Baumeister, Muraven, & Tice, 2000). Baumeister (1998; 2002) conceptualized the self into three fundamental experiences: (a) basic awareness of self-relevant information (e.g., self-knowledge, self-esteem), (b) interpersonal processes (e.g., self-presentation), and (c) executive function (cognitive processes that regulate, control, and manage self-relevant actions, of both the covert and overt types).

Executive function captures externally-oriented acts of volition and internally-oriented processes of self-regulation. More specifically, self-control is the term used to describe the

conscious and deliberate efforts to regulate behaviors, such as in the presence of impulses and temptations (Baumeister, 2002). Unsuccessful efforts in self-control are related to a broad range of behaviors. In fact, self-control failure has been linked to obesity, drug abuse, violent crime, inability to manage finances, eating disorders, unplanned pregnancy, sexually transmitted diseases, and some chronic diseases (e.g., cancer and heart disease; Baumeister, Heatherton, Tice, 1994; Hagger, Wood, Stiff, & Chatzisarantis, 2010; Muraven & Baumeister, 2000; Wills & Stoolmiller, 2002). Thus, self-control's expansive involvement in human behavior makes for an important area of study.

Tangney, Baumeister, and Boone (2004) developed a scale to measure individual differences in self-control in the areas of thoughts, emotions, performance regulation, and habit breaking. More specifically, the items assess abilities to plan ahead, organize, consider alternatives, and manage time appropriately as well as abilities to delay impulses, gain inertia and exhibit willpower. Individuals with higher self-control scores were found to have higher grade-point averages in college, report fewer impulse control problems (including binge eating and alcohol abuse), and have healthier and more stable interpersonal relationships. Additionally, the study found people high in self-control reported less psychopathology and fewer mental health problems (e.g., higher self-acceptance or self-esteem) and had fewer emotional problems (e.g., less shame, less anger, and better management of anger). Adolescents who are higher in self-control are less likely to participate in delinquent misbehaviors (e.g., fighting, vandalism, petty theft) and have better relationships with their parents (Engles, Finkenauer, den Exter Blokland, & Baumeister, 2000). Although it has been hypothesized that there might be a curvilinear relationship with high levels of self-control being problematic, several studies have found no evidence to support this concern (Tangney et al., 2004). Zabelina, Robinson, and

Anicha (2007) reported that self-control has been found to promote consistency in traits; however, this consistency is at the expense of affect and spontaneity. More research in this area is needed to indicate if these deficits may be problematic and to determine the contextual relevance of these findings.

Ego Depletion

Self-control's relationship to positive outcomes has led to efforts in understanding why some individuals have better or poorer self-control. Ego depletion refers to the temporary state of reduced self-control capacity, or reduced willingness to engage in a volitional action following an initial effortful act of will (Baumeister, Bratslavsky, Muraven, & Tice, 1998). The term was coined to pay tribute to Sigmund Freud, who contributed one of the first energy models for the self, or ego (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Importantly, rather than referring to self-control as an entity or the presence of something, the focus has been shifted to a deficit. The implication of conceptualizing self-control in this way communicates the want or need for more of it.

Ego depletion measurement. The measurement of ego depletion utilizes tasks that require an individual to exert self-control. Ego depletion is typically measured using the dual-task paradigm, which requires that all participants complete two performance tasks which may interfere with one another. Experimental-condition participants complete two consecutive unrelated self-control tasks, while control condition participants complete only the secondary task that necessitates self-control (Baumeister et al., 1998, Finkel et al., 2006; Muraven, Tice, & Baumeister, 1998). A meta-analysis by Hagger, Wood, Stiff, and Chatzisarantis (2010) reported the most frequently used tasks for initial depletion are video-watching affect regulation (watching an emotionally evocative video while suppressing emotions), video-watching attention

control (watching a dull, uneventful film waiting for “something” to occur), crossing out letters, the modified Stroop (1935; which requires participants to say the color of the ink color words are printed in while suppressing the urge to just read the words), and Wegner et al.’s (1987) white bear thought suppression task (in which participants are asked to not think about a white bear). Repeatedly used dependent tasks are the handgrip physical stamina task, solvable anagram task (solving anagrams that get increasingly difficult in a short period of time), food taste test (continuously resisting the urge to eat an enticing food for a duration of time), math or mental arithmetic, and the modified Stroop (Hagger et al., 2010). The use of ego depletion tasks in various areas of functioning (e.g., physical stamina and affect control), demonstrate generalizability to the commonly occurring demands of self-control.

Ego depletion theories and related empirical support. Self-control and ego depletion have been conceptualized in various ways. The most studied theory is that of Baumeister and colleagues. According to Muraven and Baumeister’s (2000) self-control strength model, self regulatory failure occurs because self-control is a limited resource - comparable to a tired muscle. When an individual exerts self-control in the performance of one task, the exertion causes performance decrements in subsequent, likely unrelated, tasks also requiring self-control. Like the necessary recovery period for muscles, rest and recuperation help to renew self-control resources (Baumeister & Heatherton, 1996, Muraven & Baumeister, 2000, Tyler & Burns, 2008).

Muraven et al. (1998) administered the white bear thought suppression task followed by the unsolvable anagram task, which is a dependent measure of self-control as measured by persistence, to 51 undergraduate students. Individuals in the white bear suppression condition gave up faster on the anagrams, indicating the regulation of thoughts depleted the self-control resource. This process held true with regulation of emotional reactions. Muraven, Tice, and

Baumeister (1998) had individuals regulate their emotional reactions to a distressing video clip then asked the participants to perform a behavioral measure of self-control (handgrip task of physical stamina). They found the individuals who had controlled their reactions also had shorter handgrip duration times.

Following this model, regular training, which entails engaging in repeated tasks requiring self-control, improves self-control capacity and lessens the ego-depletion effect (Hagger, Wood, Stiff, & Chatzisarantis, 2010). For example, regular exercise in self-regulation activities (e.g., regulation of posture, eating habits, and emotions) everyday for two weeks, led to improvement in self-regulatory abilities (Muraven, Baumeister, & Tice, 1999).

Additionally, ego depletion may be impacted by the expectations of future outcomes. Studies by Muraven, Shmueli, and Burkley (2006) found after an initial depleting task, participants who were informed about the subsequent task would require self-control, performed worse on said self-control task, demonstrating motivation to conserve self-control resources occurs with the anticipation of possible self-control tasks. Alternatively, people may not be able or willing to draw from those resources (Baumeister & Vohs, 2007; Muraven & Baumeister, 2000). For instance, participants may have had a certain degree of exertion they were motivated to put forth for an experiment.

A recent study by Kidd, Palmeri, and Aslin (2012) revisited Mischel's (1974) classic marshmallow task, introducing environmental reliability into the decision-making mix. In the classic marshmallow task, a marshmallow is presented to child with the instructions they can eat the marshmallow now, or wait for the researcher to come back and eat two marshmallows. In the Kidd, Palmeri, Aslin study, children who were given reason to believe their environment was reliable made rational decisions to wait significantly longer to consume the marshmallow as

compared to the children in the unreliable condition. This study emphasizes the role of context, including learning histories, to understand other contributing factors when engaging in self-control.

Competing theories posit that self-regulatory failures can be attributed to skill, fatigue, motivation, self-efficacy, affect, or be conceptualized as an artifact of experimenter demand (Hagger, Wood, Stiff, & Chatzisarantis, 2010). Two studies have shown acts of self-control resulted in reductions in glucose levels, which also predict poor self-control in future behavioral tasks, proving a physiological explanation for depletion (Gailliot & Baumeister, 2007; Gailliot et al., 2007). However, a small number of studies using similar methods have not found significant ego-depletion effects (e.g., Stillman, Tice, Fincham, & Lambert, 2009; Wright et al., 2007; Wright, Stewart, & Barnett, 2008), indicating the process is not sufficiently understood.

Counteracting ego depletion. Given the notion that self-control is integral in various domains of living, methods of counteracting ego depletion have been proposed and empirically tested. In one of the previously mentioned studies that found a physiological effect of ego depletion (Gailliot & Baumeister, 2007), researchers discovered replenishing individuals with a sufficient amount of glucose aided in increasing the self-control source. Gailliot and Baumeister's (2007) study found depleted individuals quit sooner on the prolonged effortful task after being asked to think about death, yet a glucose shake worked to replenish their self-control resources.

Another study introduced implementation interventions to counteract the effects of ego depletion (Webb & Sheeran, 2003). Implementation interventions are a method of instructing the individual to follow a procedure in order to ensure success in the task by passing control to environmental cues. Results of one experiment indicated that the implementation intervention

(instructing the individual to only focus on the second letter of the word) during the Stroop task resulted in longer duration efforts on a subsequent unsolvable puzzles task compared to those who did not use the intervention. A different experiment, by the same researchers, used individuals who were depleted on an initial self-control task and found the same implementation intervention improved performance on the later administered Stroop task (Webb & Sheeran, 2003).

Another way to counteract the occurrence of ego depletion is to include self awareness in experimental paradigms (Alberts, Martijn, & de Vries; 2011). It was theorized that participants who receive self-awareness primes would not demonstrate decreases in their performance on secondary tasks of self-control. Therefore, Alberts et al. (2011) had participants complete a self-awareness manipulation consisting of sentences related to the self using the scrambled sentence task (SST; Srull & Wyer, 1979). The study found participants who were exposed to the self-awareness manipulation performed significantly better (i.e., persisted longer) on the dependent measure of self-control (handgrip task).

It is important to note the SST may be limited to the degree to which it explains the level of self-awareness in which the individual is engaged; therefore, what impact self-awareness may actually have on self-control may be inaccurate. One explanation is that self-awareness prevents individuals from becoming overly focused on the present, and instead aids in directing their behavior toward future outcomes (Kuhl, 1982; Vohs & Schmeichel, 2003).

In contrast, mindfulness, a process of self-awareness and contact with the present moment, was investigated to determine its relationship to ego depletion. Friese, Messner, and Schaffner (2012) found a brief period of mindfulness counteracted the effects of self-control exertion. Specifically, participants were distributed into one of three experimental conditions (no

emotion suppression, emotion suppression, and emotional suppression plus meditation). The participants were shown videos selected to evoke reactions of disgust, and the suppression conditions was asked to suppress emotional reactions. The emotional suppression plus meditation condition was asked to engage in meditation for a duration of five minutes, while the other conditions completed a mundane task. Lastly, all conditions were asked to complete a task of attention and concentration to measure self-control. Results demonstrated those in the emotion suppression conditions showed decrements in self-control performance on the self-control task. Individuals who meditated performed as well as individuals who had not exerted self-control (emotion suppression) in the first task. However, the participants in the study were approached on the second day of a 3-day introductory meditation seminar. This allowed the individuals to be exposed and trained on mindfulness practices for at minimum a full day. Therefore, they likely already adjusted to the sensations of engaging in mindfulness. The participants also sought out mindfulness by enrolling in the workshop and likely welcomed and were prepared for the experience.

Mindfulness

Mindfulness goes beyond awareness in regards to allowing an individual to experience the present moment non-judgmentally and openly, including one's sensations, thoughts, bodily states, consciousness, and other factors in the environment (Kabat-Zinn, 2003). Mindfulness is different than meditation, in that meditation is the practice of increasing the skill of mindfulness, in order to attend to every momentary experience (Kabat-Zinn, 2005, Shapiro, Carlson, Astin, & Freeman, 2006). A method of increasing mindfulness skills involves focusing attention on the breath, and as thoughts and feelings arise, demonstrating acceptance of them and gentle

redirection to the breath. With practice, these skills can be applied throughout the day to bring awareness to the present, using the breath as an anchor (Bishop et al., 2004).

Mindfulness is a type of mental training to decrease mental vulnerability that may lead to emotional distress or enable psychopathology (Bishop et al., 2004). The mental training is believed to mediate observed effects on mood and behavior (Kabat-Zinn, 2005). Rather than further ruminating on thoughts, a thought is acknowledged, and then attention is guided back to the breath (Bishop et al., 2004).

However, mindfulness is not a relaxation technique. In fact, people are likely not mindful, because for some, their moment to moment experience is painful (Rosch, 2007). Mindfulness involves a direct experience of events in the mind and body and with the external world. When individuals have experience in meditation, the observation of experiences and the ability to view them in an accepting, compassionate way are positively correlated. Without the meditation practice, these processes are negatively correlated—observing is associated with judging (Baer et al., 2006).

Mindfulness' recent attention in the areas of psychotherapy and empirical psychology has also raised an interest in better understanding the process. Eleanor Rosch (2007) emphasizes the importance of investigating the types of experiences a person may have in response to mindfulness instructions, as use of mindfulness techniques vary in practice. Therefore there is importance in identifying the mechanisms of action (Baer, 2003). More research is needed to determine if there is a true distinction between the psychological effects of mindfulness and relaxation, and if mindfulness offers something unique to current cognitive-behavioral interventions.

Mindfulness is being included in more therapies, and it is important to examine the implications of its use. For example, mindfulness based stress reduction (MBSR), dialectical behavior therapy (DBT), mindfulness based cognitive therapy (MBCT), and acceptance and commitment therapy (ACT), all involve training in mindfulness in an effort to improve mental health. These “third wave behavioral therapies” tend to use mindfulness techniques and experiential change strategies to change an individual’s relationship to psychological events rather than directly change the content. All of these treatments include acceptance of body sensations (e.g., pain, discomfort), thoughts, and feelings without attempting to change, escape, or avoid them (Baer, 2003). ACT, however, is the first therapy to use values and commitment to action as targets of behavioral activation (Rosch, 2007).

ACT

The current study is conceptualized from an ACT perspective. ACT (Hayes, Strosahl, & Wilson, 1999) is an approach to treatment that integrates a mindful component to connect with the present moment. Contact with the present moment is one of six core processes of the ACT model, which also includes acceptance, cognitive defusion, self-as-context, valuing, and committed action. Mindfulness changes the context in which thoughts or feelings occur, rather than attempting to change an individual’s thought content (Hayes & Plumb, 2007; Teasdale, Moore, & Hayhurst, 2002). ACT emphasizes the role of language as a method of avoiding contact with private experiences (e.g., bodily sensations, thoughts, emotions, memories; Hayes et al., 1999). This process is termed experiential avoidance – the act of controlling or changing the form, frequency, or situational sensitivity of internal experiences, even when efforts to control these private experiences cause harm (Hayes, et al., 1996). These efforts are typically maladaptive strategies and are significantly related to general and specific presentations of

psychological symptoms and problem behaviors (Bishop et al., 2004; Hayes et al., 2004; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Kashdan, Barrios, Forsyth, & Steger, 2006; Schmalz & Murrell, 2010).

Mindfulness is incorporated to help individuals “defuse from,” or become less attached to, the literal meaning of their thoughts. An individual, for example, might become aware of their bodily sensations and thoughts, and subsequently demonstrate a non-judgmental acceptance of experiences rather than engage in control strategies in attempts to remove or alter them.

Mindfulness includes the deliberate decision to let go of one’s agenda so that thoughts, feelings, and sensations may be experienced freely (Hayes, Strosahl, & Wilson, 1999).

However, mindfulness requires extensive training and practice. It is not natural, typical human behavior to nonjudgmentally accept one’s internal experiences, a phenomenon that may be difficult to capture in research and clinical settings (Roemer & Orsillo, 2003). Baer, Smith, and Allen (2004) found that simply observing one’s experiences does not indicate acceptance. Observing is positively correlated with dissociation, thought suppression, and psychological symptomatology (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). This suggests that unless approaching experiences in an accepting, non-judgmental manner, simply observing may lead to the initially maladaptive behaviors of resisting and avoiding unwanted sensations.

Bishop et al. (2004) propose mindfulness is in itself an act of self-regulation of attention, involving sustained attention, attention switching, and the restriction of further processing. The relationship between mindfulness and self-control has been previously explored. In a study by Black, Sempke, Pokhrel, and Grenard (2011), self-control schedule scores and planful behavior dimension scores correlated with a measure of mindful attention and awareness. This relationship between self-control, mindfulness, and planning may emerge because the benefits of

mindfulness can be thought of as increased self-regulation or self-control. Bowlin and Baer (2012) help make a distinction between these two constructs; they found mindfulness accounts for a significant amount of variance in psychological wellbeing, over and above self-control, and mindfulness moderates the relationship between self-control and psychological symptoms.

Role of instructor. A teacher or facilitator is typically involved in the aforementioned therapy systems using mindfulness training as a component. Individuals are not left to their own accord; instead, they are given specific sets of instructions (Rosch, 2007). Instructors serve to lead research participants or clients through mindfulness trainings and allow them time to attend to their breathing, to become aware of thoughts or bodily sensations, and to remind them to stay with the experience.

Role of letting go. All of the mentioned therapy systems incorporate a facet of “letting go,” or “surrendering to one’s experience” (Rosch, 2007). Willingness and motivation are two contextual factors that influence this experience. From an ACT perspective, this would be conceptualized as acceptance. When a client is having difficulty allowing themselves to accept their personal experiences, they may be engaging in experientially avoidant behaviors. For example, an individual experiencing anxiety symptoms, may try to control their symptoms by limiting situations where the symptoms occur. The individual with anxiety may begin to expect the symptoms to occur in attempts to seize control back. They may also monitor and ruminate over the symptoms, as if willing the experience to disappear (Bertrams, Englert, Dickhäuser, & Baumeister, 2013). This experientially avoidant behavior is adaptive, at times. However, individuals who attempt to control their negative thoughts not only fail at doing so, but also demonstrate self-reported mood change in the opposite direction (Wegner, Erber, & Zanakos,

1993). Experiential avoidance may play a role in this process, limiting available resources due to effort in changing or controlling internal experiences.

“Letting go” is quite different from the act of suppressing or otherwise controlling thoughts. The presence of thought suppression has been found to correlate with measures of obsessional thinking and depressive and anxious affect. Thought suppression is also predictive of clinical obsession and depression in individuals who already have a tendency to engage in obsessional thinking, as well as disliking negative thoughts, respectively (Wegner & Zanakos, 1994). Suppression is a form of emotion regulation which tends to be associated with negative outcomes; suppressive efforts often lead to more of the distress which the individual was attempting to avoid (John & Gross, 2004). The emotion regulation strategy, reappraisal (interpreting a situation in positive terms), has been found to be beneficial in reducing negative emotional experiences, without cognitive or social consequences (Kashdan et al., 2006). Mindfulness may play a role in reappraisal, in that it experiences the situation in a non-judgmental, non-avoidant way.

A study by Frewen, Evans, Miraj, Dozois, and Partridge (2008) examined individual differences of dispositional mindfulness (i.e., trait mindfulness; frequency in which individuals experience states of mindfulness versus brief periods of mindfulness) by using measures (e.g., Kentucky Inventory of Mindfulness Skills; Baer et al., 2004) that inquired about the extent to which individuals notice and attend to internal (e.g., breathing) and external stimuli (e.g., sounds). Differences in dispositional mindfulness were associated with a low frequency of negative thoughts (e.g., depressive, worry, and social fears), and an increased capacity to let go of negative thoughts.

The current study assesses whether the process of controlling internal experiences will negate the effectiveness of mindfulness techniques. Self-control may be related to why mindfulness interventions work (e.g., regulation of one's thoughts and feelings); however, more work is needed to determine if mindfulness may lead to negative outcomes.

The Present Study

The role of mindfulness as a method of increasing self-control resources has not been sufficiently investigated. The current study examined the role of mindfulness as an ego depleter, as mindfulness with the purpose of increasing self-control may negate the process of letting go of outcomes. Effortful attention to breathing and instruction may function as a way of exhausting an individual's resources when individuals may not be primed for the specific level of awareness. This study also examined whether individuals without a history of mindfulness training (e.g., meditation, mindfulness practice, yoga, etc.) still demonstrated improvements in self-control. Finally, this study investigated the roles of experiential avoidance as well as the roles of depression, anxiety, and stress symptoms in an individual's ability to engage in the mindfulness process. Individuals without practice often have difficulties being able to accept their surroundings in a compassionate way (Baer et al., 2006). This study intended to elucidate the role of factors potentially limiting and interfering with an individual's self-control resources when engaging in mindfulness exercises. Thus, results may provide valuable information as it relates to therapeutic settings. Specifically, the following hypotheses were tested:

Hypothesis 1: The mindfulness exercise was expected to deplete self-control resources.

- a. Individuals who completed the mindfulness exercise were expected to perform significantly worse (i.e., give up sooner) on the anagram task than those who did not complete the mindfulness exercise.

- b. Individuals who completed the mindfulness exercise with instructions were expected to perform significantly worse on the anagram task than the individuals who completed the mindfulness exercise without instructions.

Hypothesis 2: Individuals who were more initially mindful (i.e., participants who had higher KIMS scores and/or who reported prior mindfulness practice) were expected to perform significantly better on the anagram task than those who were initially less mindful (those with lower KIMS scores and/or who did not report prior mindfulness practice).

Hypothesis 3: Experiential avoidance scores were expected to be negatively correlated with performance on the anagram task regardless of mindfulness condition.

Hypothesis 4: Individuals with higher scores on a measure of depression, anxiety, and stress were expected to be negatively correlated with performance on the anagram task.

CHAPTER 2

METHOD

Participants

Participants of this study were adult undergraduates enrolled in the University of North Texas, participating as part of their course curriculum or to earn three credits through the Sona system. To be included in the study, participants had to be at least 18 years of age and speak English. In addition, participants were asked to fast for a minimum of four hours prior to participating in the study in order to control for the effects of glucose on self-control capacity (Gailliot & Baumeister, 2007; Gailliot et al., 2007). No other specific inclusionary or exclusionary criteria were made.

A total of 81 participants provided consent and completed the study. Several participants were removed from the database for a variety of reasons which are further addressed in the Results section. Data from a total of 67 participants who completed the study in accordance with specifications were used in statistical analyses. Descriptive information, including age, gender, ethnicity, and other significant demographic characteristics of the sample were obtained and are presented in Table 2. Mean age of the sample was 19 years ($SD = 1.98$), with a range of 18 to 29 years. The sample was 73.1% female ($n = 49$) and 26.9% male ($n = 18$). The following demographic characteristics were observed in the sample: 43.3% White/Caucasian ($n = 29$), 29.9% Hispanic/Latino ($n = 20$), 9% African American/Black ($n = 6$), 9% Biracial ($n = 6$), 4.5% Asian/Pacific Islander ($n = 3$), and 3% Other ($n = 2$).

Measures

The Kentucky Inventory of Mindfulness Skills (KIMS). The Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004) is a 39-question self-report measure to

assess facets of mindfulness including: observing (paying attention to internal and external stimuli), describing (labeling observations without judgment), acting with awareness (participating fully in current activity), and accepting without judgment (allowing without evaluation). The KIMS items are rated on a 5-point Likert-type scale ranging from 1 (*never true*) to 5 (*almost always or always true*), and is used on variant populations, including those without mindfulness experience. Example items include, “I pay attention to whether my muscles are tense or relaxed,” and “I tell myself I shouldn’t be feeling the way I am feeling.” The KIMS was normed using two undergraduate samples, and a clinical sample of adults with borderline personality disorder (BPD), with samples of 205, 215, and 26, respectively. The KIMS subscales exhibited a good range of internal consistency ($\alpha = .79-.91$). Test-retest reliability was adequate to good, ranging from .65 to .86, on a sample of 49 students after a 14 to 17 days time interval. The KIMS subscales (Observe, Describe, Act/Aware, Accept) show convergent validity with measures of constructs theoretically related to mindfulness such as emotional intelligence, life satisfaction, and openness. Divergent validity was demonstrated in measures of general symptomatology (-.38 to -.29) neuroticism (-.42 to -.31), alexithymia (-.66 to -.33), dissociation (-.28), and experiential avoidance (-.35 to -.26; Baer et al., 2004).

In the current study, the four subscales of the KIMS were summed to obtain a composite score, which was then used in analyses as a measure of overall mindfulness skills. Internal consistencies for the scales ranged from acceptable to excellent: Composite ($\alpha = .75$), Observing ($\alpha = .73$), Describing ($\alpha = .91$), Acting with Awareness ($\alpha = .76$), and Accepting ($\alpha = .87$).

Brief mindfulness protocol. The mindfulness protocol is a 10-minute audio recording of a guided meditation script (Walser & Westrup, 2007) which brings awareness to the participant’s

breath, bodily sensations, thoughts, and environment. The protocol asks the participant to deeply experience the present moment.

Unsolvable anagram. This is a problem-solving task which requires the individuals to complete ten anagrams (e.g., unscramble letters to form a word) that measures persistence in the face of failure. Measurement of persistence on unsolvable puzzles has frequently provided behavioral evidence of frustration tolerance (e.g., Glass, Singer, and Friedman, 1969) and is similar to tasks used in ego depletion literature (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven, Tice & Baumeister, 1998). Participants are presented with a list of anagrams, explanation of how to solve the problems, and the following instructions: “Unscramble each set of letters to form a common English word. For example, RCASD would unscramble to form the word CARDS.” Participant attempts are timed, with a 30-minute cap.

The Avoidance and Fusion Questionnaire for Youth (AFQ-Y). The Avoidance and Fusion Questionnaire for Youth (AFQ-Y; Greco, Murrell, & Coyne, 2005) is a 17-item self-report measure used to assess experiential avoidance and cognitive fusion. While the measure was originally developed and normed in a child and adolescent population, the measure has been used successfully in undergraduate populations (Fergus et al., 2012; Schmalz & Murrell, 2010) and in adult clinical samples (Fergus et al., 2012). Participants are asked to rate how true an item is for their self on a 5-point scale that ranges from 0 (*not at all true*) to 4 (*very true*). A total score is computed by a summation of all 17 items, with a possible range of 0 to 68, where high scores indicate greater psychological inflexibility. The items assess fusion (e.g., “The bad things I think about myself must be true”), experiential avoidance (e.g., “I push away thoughts and feelings that I don’t like”), and behavioral inflexibility related to an aversive internal experience (e.g., “I stop doing things that are important to me whenever I feel bad”). Items on the AFQ-Y

have good internal consistency reliability, ranging from 0.84 to 0.92 in undergraduate samples (Fergus et al., 2012; Larson, 2011; Schmalz & Murrell, 2010). Items on the AFQ-Y have also been found to correlate positively with depression ($r = .59$), anxiety ($r = .53$), and stress ($r = .55$) measured by the DASS (Schmalz & Murrell, 2010). Internal consistency reliability for the current study was found to be good ($\alpha = .85$).

Depression Anxiety Stress Scales (DASS). The Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995) is a 42-item self-report measure with three subscales: Anxiety, Depression, and Stress. The DASS' essential function is to assess the severity of the core symptoms of these three negative emotional states within either clinical or non-clinical populations. Participants are asked to respond to questions on a 4-point scale that range from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). The three subscales demonstrate strong reliability across samples (nonclinical, panic disorder, obsessive-compulsive disorder, social phobia, specific phobia, and major depressive disorder; $N = 290$). The internal consistency of Depression, Anxiety, and Stress subscales has Cronbach's alphas of .97, .92, and .95, respectively (Antony, Beiling, Cox, Enns, & Swinson, 1998). In the initial validation studies, the DASS depression, anxiety, and stress subscales displayed concurrent validity with other measures of depression and anxiety, .77, .84, .59, respectively (Antony et al., 1998). Internal consistency was calculated for the present study and ranged from good to excellent; DASS composite score ($\alpha = .93$), depression ($\alpha = .92$), anxiety ($\alpha = .78$), and stress ($\alpha = .86$).

Demographics questionnaire. This questionnaire asked participants to provide information such as age, gender, ethnicity, education level, and socioeconomic status. At the end of the demographics information, there was a question related to whether or not the person has

practiced mindfulness, meditation, or yoga before. Given mindfulness is a skill and some literature indicates level of depletion may be affected by familiarity level or practice, this variable was correlated with the variables of interest to determine if it was necessary to use as a covariate. Also included on this questionnaire were a few questions about the participants' perception of the experimental procedure (to be described below) to be used as manipulation checks.

Procedures

Participants were randomly assigned into one of three conditions, one control condition ($n = 21$) and two experimental conditions: mindfulness ($n = 22$) and mindfulness plus expectations ($n = 24$). First, participants were asked to read the informed consent form and to consent to their participation. They were allowed to ask questions about the experiment and the benefits and risks were explained to them. All participants were specifically informed about potential discomfort or frustrations associated with the tasks (e.g., mindfulness exercise, anagram self-control task). Researchers informed all participants that Sona system credits would be assigned upon completion of the study. Next, all conditions completed a 10-minute "vanilla" baseline during which they were asked to sit and look at neutral stimuli (these stimuli had been ranked as neutral in normative groups in the International Affective Picture System, and in current sample). More specifically, a pilot study to establish reactions to picture stimuli was conducted in the same setting. Participants were asked to rate level of reaction on a 5-point scale that ranges from 1 (*neutral/no reaction*) to 5 (*extremely high reaction*). Then t -tests were conducted to ensure that the ratings of pictures were indeed neutral. Results for all 25 pictures (using one sample t -tests comparing to population means) ranged from -14.25 to .37, with means on a scale from 1 to 2.5 all being in the neutral range, from 1.22 to 2.47.

This baseline period served as an attempt to ensure that all participants were physiologically “settled-in” in the room and that, to the extent that it is possible, their emotional and cognitive beginning state were equalized. Then, participants in all conditions completed the KIMS. The control condition was then asked to wait while the experimenter prepared the materials for the next task. The two experimental conditions participants were asked to engage in a mindfulness exercise before completing further tasks. The participants in mindfulness plus expectations experimental condition were provided further instruction; they were informed their performance during the mindfulness exercise would increase their abilities to successfully complete the next task (i.e., “You are about to listen to an audio recording of a guided mindfulness meditation. Your performance during this mindfulness exercise will increase your ability to successfully complete the next part of the experiment.”). Afterwards, all participants completed the unsolvable anagrams, the AFQ-Y, DASS, and demographics form. Order of tasks was kept stable across conditions to reduce fatigue effects that may have impaired the self-control manipulations. The average completion time was approximately an hour and a half. See Table 1 for a visual representation of study design. Upon completion of all measures, participants were given an opportunity to ask questions and were asked not to mention to others that the anagram task was unsolvable to preserve the integrity of the study. Notes about any questions and any unusual descriptions or deviations from the protocol were recorded by the researcher at this time. All participant data was kept separate from information considered personally identifiable, and the master list that connects name to number will be destroyed after all Sona credits have been cleared from the semester.

CHAPTER 3

RESULTS

Data Preparation and Preliminary Analyses

General screening guidelines as delineated by Tabachnick and Fidell (2001) were utilized. The distribution and pattern of missing data was first evaluated. A total of 81 individuals participated in the study; however, six individuals did not fast prior to participating in this study and were removed from the sample. In addition, eight participants were removed due to limitations regarding testing environment; for example, disruptions during administration. Five other participants had one missing data point on different questions of the AFQ-Y or DASS. These individuals were dummy coded for missing data versus no missing data, and an independent sample *t*-test comparing the two groups suggested the individuals were missing data at random rather than due to a pattern. Their mean item score for the measure was imputed in place of the missing data point. The remaining cases were further examined to assess appropriateness for statistical analyses.

Standardized scores and frequency histograms were examined for univariate outliers on variables relevant to hypothesis testing: the total scores for the KIMS, AFQ-Y, DASS, time persisted, and past mindfulness practice. The recommended *Z*-score of ± 3.29 was used as the value of significance (Tabachnick & Fidell, 2011); no cases containing outliers were found. Skewness and kurtosis data were, then, examined according to procedures outlined by Tabachnick and Fidell (2001) for the same variables listed above. Using the calculation for excessive skewness and kurtosis (skewness/standard error of skewness and kurtosis/standard error of kurtosis), an absolute value of 3.3 or greater was used to determine significant deviations from normality. Results indicated that DASS depression subscale exhibited significant positive skewness and moderate positive kurtosis. Therefore, the DASS depression subscale total scores

were squared and the variable subsequently met the assumption of normality. In addition, the awareness of unsolvability variable was also found to have significant positive kurtosis and was corrected for by using the log of total squares. Scores in tables and analyses reflect corrected variables.

Prior to hypothesis testing, the assumptions corresponding to each statistical test were assessed through statistical analyses and/or graphic representation. In order to conduct the ANOVA, preliminary analyses were conducted to ensure that there were no violations of the assumptions of independence of observations, normality, or homoscedasticity. A series of correlations were conducted to test the assumption of multicollinearity (see Table 4). No variables utilized in hypothesis testing were found to have correlations large than .70, which suggests no concern about multicollinearity (Tabachnick & Fidell, 2001).

Finally, the assumptions of linearity, homoscedasticity, and homogeneity of error variance were further examined for each regression equation with a series of scatterplots. Normal probability plots and standardized residual scatterplots were visually examined to determine if assumptions of linearity, homoscedasticity, and homogeneity of error variance were met. Visual inspection of these plots suggested significant heteroscedasticity, which was determined to be related to the nonlinear distribution of the time persisted scores. Therefore, the total time persisted variable was squared in order to reduce deviations from normality, as suggested by Tabachnik and Fidell (2001). Heteroscedasticity was reduced after the transformation.

Descriptive Statistics

After deletion of ineligible participants, the total useable sample was comprised of 67 undergraduates. The sample was composed of more females than males and mostly of individuals who identified as White/Caucasian (see table 2). Means and standard deviations were

calculated for variables of interest (see table 3). Inspection of participant responses to manipulation checks indicated that individuals on average felt neutral levels of confidence with solving the anagram ($M = 2.76$), and 55% of individuals ($n = 37$), indicated that they did not know the task was unsolvable.

Correlations were conducted to examine the relationship between the variables of interest in the study (see table 4). Consistent with the literature, significant correlations were found between the composite score of the KIMS with its subscales: Observe ($r = .46, p < .001$), Describe ($r = .64, p < .001$), Awareness ($r = .49, p < .001$), and Accept ($r = .43, p < .001$). Similarly, significant correlations were also found between the composite score of the DASS with its subscales: depression ($r = .64, p < .001$), anxiety ($r = .86, p < .001$), and stress ($r = .92, p < .001$).

The correlation matrix presented relationships between the AFQ-Y and DASS composite and subscales: DASS composite ($r = .48, p < .001$), depression ($r = .47, p < .001$), anxiety ($r = .38, p = .001$), and stress ($r = .44, p < .001$), which is consistent with the literature (Feldner, Zvolensky, Eifert, & Spira, 2003; Schmalz & Murrell, 2010; White et al., 2012). The AFQ-Y was significantly negatively correlated with the KIMS accept subscale ($r = -.42, p < .001$), consistent with existing literature (Schmalz & Murrell, 2010), and with the KIMS composite scale ($r = -.36, p = .003$). The KIMS accept subscale was also significantly negatively correlated the DASS composite score and subscales: DASS composite ($r = -.45, p < .001$), depression ($r = -.44, p < .001$), anxiety ($r = -.48, p < .001$), and stress ($r = -.32, p = .009$). The KIMS awareness subscale was also significantly negatively correlated the DASS composite score and stress subscale, ($r = -.26, p = .033$) ($r = -.36, p = .002$), respectively. Additionally, the KIMS observe subscale was significantly related to the DASS composite ($r = .26, p = .031$), and depression ($r =$

.36, $p = .002$) and anxiety ($r = .24$, $p = .049$) subscales, associations supported in the literature (Baer et al., 2006; Baer et al., 2008; Desrosiers, Klemanski, & Nolen-Hoeksema, 2013a; White et al., 2012).

Unexpectedly, the time persisted was significantly strongly associated with the report of awareness of unsolvability ($r = .98$, $p < .001$). The KIMS awareness subscale ($r = .27$, $p = .028$) was also significantly correlated to awareness of unsolvability ($r = .27$, $p = .028$) and time persisted ($r = .25$, $p = .05$). Lastly, a correlation was conducted to assess for researcher effects and time persisted on the task; no significant relationship was found ($r = -.05$, $p = .664$).

Hypothesis Testing

Hypothesis 1. The two-part hypothesis that individuals who completed a mindfulness protocol would persist a significantly shorter time than individuals who did not complete a mindfulness protocol on an unsolvable anagrams task was analyzed through an ANOVA.

Hypothesis 1a and 1b. An ANOVA was conducted to assess between group (control, mindfulness, mindfulness plus expectancy) differences, using time persisted as the dependent variable. Levene's test of equality, used to test for heterogeneity of variance, was non-significant ($p = .69$), indicating assumption of homogeneity was supported. No significant main effects were found for condition, $F(2, 64) = .13$, $p = .882$. As such, the hypothesis stating the mindfulness condition would perform significantly worse than the control condition, was unsupported. Similarly, the hypothesis that individuals in the mindfulness expectancy condition would perform significantly worse than the mindfulness without expectancy condition, was also unsupported.

Hypothesis 2. The hypothesis that individuals who were more initially mindful would perform significantly better on the anagrams task than those who were less initially mindful was

assessed with an ANOVA as well. Again, the dependent variable was time persisted and the independent variable was group, based on KIMS scores (high, middle, or low range of initial mindfulness). Levene's test was used to test for equality variances and was not significant ($p = .24$), indicating that an ANOVA was appropriate. The main effect, $F(2, 64) = .56, p = .577$, revealed no significant differences in anagram persistence between individuals who reported varying levels of mindfulness prior to the anagram task.

Hypothesis 3. The hypothesis predicting that participants with higher experiential avoidance scores would have lower persistence on the unsolvable anagram task, as evidenced by negative correlations between time persisted on the anagram task and AFQ scores, was analyzed using a Pearson's correlation. A non-significant Pearson's correlation was found between the total score on the AFQ-Y and time persisted ($r = .00, p = .99$). As such, the relationship between experiential avoidance and persistence on an ego depletion measure was unsupported.

Hypothesis 4. The hypothesis that individuals with higher scores on a measure of depression, anxiety, and stress would be negatively correlated with performance on the anagrams task was analyzed using a Pearson's correlation. A Pearson's correlation was conducted between total score on the DASS and time persisted ($r = .16, p = .191$). As such, the relationship between depression, anxiety, and stress scores and persistence on an ego depletion measure was unsupported.

CHAPTER 4

DISCUSSION

In order to better understand the impact of mindfulness practice on individuals, this study examined the role of mindfulness practice as a form of ego depletion. No statistical significance was found in the present sample, similar to other studies that have not detected ego depletion effects (e.g., Stillman, Tice, Fincham, & Lambert, 2009; Wright et al., 2007; Wright, Stewart, & Barnett, 2008). The results of these research questions and general implications are discussed along with the practical and conceptual limitations and considerations for future directions.

Hypothesis 1

Participants in this study were either presented with a brief mindfulness recording (experimental conditions: mindfulness and mindfulness-plus-expectancy) and asked to attend to aspects of their external and internal experience with open awareness, or asked to sit and wait for the next task for the same length of time. The mindfulness-plus-expectancy condition was additionally informed their performance on the mindfulness task would increase their ability to correctly complete the puzzle. No statistical, significance was found when examining condition by time persisted on an impossible anagram task. It is surprising that the introduction of a mindfulness technique did not impact how individuals responded to a subsequent self-control task. Previous studies have shown that beginning to do mindfulness work is associated with ruminative behaviors, which may lead to resisting and avoiding unwanted sensations (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). It was reasonable to assume that such avoidance behaviors would include failure to persist on the unsolvable anagram task. On the other hand, some studies have shown that mindfulness has beneficial results in relation to self-regulation (Bishop et al., 2004; Posner & Rothbart, 1992). It appears as if varying results may have

something to do with length of time as a varying factor. When mindfulness has been proven helpful in terms of self-regulation and stress the effects have not been immediate. For example, mindfulness effects on self-control capacity were found on day 2 of a 3-day mindfulness workshop (Friese, Messner, & Schaffner, 2012). Research assessing weekly changes in a sample of individuals with chronic stress demonstrated that significant increases in mindfulness do not occur until week 2. Further, decreases in stress do not occur until week four (Baer, Carmody, & Hunsinger, 2012). Given that this study found no relationship, it may be important to track the relationships between mindfulness, self-control, and distress over time – at the beginning of mindfulness practice, over several weeks, and after months or years of mindfulness work. If the current study's findings are accurate, then it may be worth examining the value of the outcome on distress, related to beginning mindfulness.

Other researchers who have not detected ego depletion effects suggested that the reason may be the presence of unaccounted for moderating factors (e.g., features of the tasks used). As examples, presence of larger effects were related to complex versus simple presentation of the tasks, motivational incentives, training in tasks, glucose supplementation, and believability that the subsequent tasks would require self-control (Hagger et al., 2010). There are several features of the task (e.g., what participants thought about the “vanilla baseline,” what participants in the control condition were doing and what internal experiences they were having in their wait time, whether participants in the expectancy condition bought into the rationale, etc.) that may be related to interpretation of null findings in this study. In addition, more quantitative and qualitative information about participants' amount and type of previous training in mindfulness and mindfulness-related tasks may have contributed to a greater understanding of the current findings.

Hypothesis 2

Participants who were more initially mindful did not perform significantly different than those who were less initially mindful. This was unexpected given previous literature that indicated mindfulness practice mediates mood and behavior (Kabat-Zinn, 2005). If the findings from this study accurately reflect the relationship between mindfulness and ego-depletion in other settings and samples, then it is important to consider that mindfulness may not be like a muscle (Hagger, Wood, Stiff, & Chatzisarantis, 2010; Muraven, Baumeister, & Tice, 1999). However, it may be the case that demands of the research designs were ineffective in influencing persistence on the task. It is also imperative to clarify to which demands the individuals reporting trait-based mindfulness were responding.

Hypothesis 3

Higher experiential avoidance scores were not negatively correlated with time persisted on the unsolvable anagram task. It was hypothesized those who were less willing to be present with their own discomfort regarding the difficulty of the puzzle would give up sooner than those who were more willing. A relationship was not detected between these two variables. This is inconsistent with literature indicating that individuals with low levels of experiential avoidance perform better on a task, compared to individuals with higher levels of experiential avoidance (López et al., 2010). Although the AFQ-Y accounts for specific setting factors, one explanation is that responses may have indicated general willingness, separate of how participants approached the specific previous task (Greco, Murrell, & Coyne 2005; Schmalz & Murrell, 2010). Furthermore, it is possible that for some, the unwillingness to have discomfort may have been tied to “giving up.” To clarify, in order for individuals to discontinue working on the task, they had to express to the researcher that they were unsuccessful. Therefore, conceptually,

individuals who did not want to sit with the discomfort of not knowing, had to choose between the ambiguous experience, and the experience of confessing defeat. Perhaps, the expectation to detect ego depletion may have been contingent on whether participants believed their choice to discontinue was autonomous (i.e., autonomous self-regulation) or controlled (e.g., self-control). Previous research indicates that just the latter is depleting (Moller, Deci, & Ryan, 2006). Although, self-control and self-regulation are often used interchangeably in the ego depletion literature, evidence suggests that careful attention should be placed on how they differ (Baumeister et al., 2007; Hofmann et al., 2007).

Hypothesis 4

As an extension of hypothesis 3, and the relationship between experiential avoidance and depression, anxiety, and stress symptoms, higher scores on the DASS were hypothesized to be negatively correlated with time persisted on the unsolvable anagrams task. No significant relationship was detected between these two variables. These findings are surprising, given that people high in self-control report less psychopathology and fewer mental health problems; therefore, it was expected that self-control abilities would be associated with higher scores on the DASS (Tangney, Baumeister, & Boone, 2004). In this sample there is no indicated relationship; this suggests expression of depression, anxiety, and stress may not be related to self-control capacity. It could be that experiencing stress may not influence an individual's ability to persist on a measure of self-control (Rosenbaum, 1989). It might also be that individuals in the current study were fully immersed in filling out measures following the unsolvable task such that they did not slow down enough to contact any additional discomfort. It would also reason that individuals may have been distracted by "correctly" responding to the present tasks (i.e., endorsing items on self-report measures). Therefore, participant responses may be indicative of

reduced ego-depletion as a result of a distracter task (Alberts, Martijn, Nievelstein, Jansen, & de Vries, 2008). In contrast to other designs using a similar task, individuals were asked about awareness of unsolvability, but were not given any additional questionnaires to complete (Muraven, Tice, & Baumeister, 1998). Recent findings indicate that rumination and worry significantly mediate associations between mindfulness and anxiety and depression symptoms (Desrosiers, Klemanski, & Nolen-Hoeksema, 2013b). It may be that individuals were no longer ruminating or worrying, or may not have ever ruminated, thereby reducing the context for symptoms to occur.

Implications

Results of the current study suggest despite the introduction of mindfulness practices, significant differences were not detected for decrements in self-control capacity. Further no significant relationship was found between time persisted on the unsolvable task with experiential avoidance, depression, anxiety, nor stress scores. Surprisingly, self-reports of being aware of the puzzles' unsolvability were strongly associated with longer persistence on the self-control task. This finding brings up concerns about the effectiveness of an awareness of unsolvability question as a manipulation check, and whether individuals were persisting longer on the tasks due to other factors. This idea will be discussed further below.

Post hoc analyses did find that the KIMS acting with awareness subscale was significantly associated with time persisted on the task. This subscale measures a central element of many descriptions of mindfulness practice, fully immersing and focusing on one thing at a time (Baer, Smith, & Allen, 2004). This finding suggests individuals who are in the habit of participating mindfully in activities behaved consistently on the self-control task.

The experimental preparation of this study gave emphasis to external validity, by controlling for glucose prior to participating in the study, allowing for continued baseline by having participants look at neutral stimuli, and by having the control condition wait for the same amount of time. It is likely that these efforts to create consistency across individuals may have had some unexpected consequences. For example, individuals in the control condition were asked to wait for 10 minutes, the same amount of time the other conditions were completing the mindfulness task. There is a possibility this time would have served to deplete individuals. It was observed many individuals looked uncomfortable sitting and many attempted to use their phones. There is likeliness the students in this demographic are not accustomed to being still without engaging in something distracting. Perhaps, participants in the control condition were similarly depleted, by becoming aware of internal experiences. Or an alternative possibility is that participants may have been self-regulating thoughts related to demands of the study and/or the rest of their day—thereby making the waiting serve as a depleting task (Muraven et al., 1998). An alternative approach may have included the use of a mundane task, such as connect-the-dot images (Friese, Messner, & Schaffner, 2012).

Limitations

An intentional difference in the present study's design from other ego depletion studies was the presence of a baseline task. Participants were presented with neutral stimuli for ten minutes in order to control for any arousal that may have occurred prior to arriving for the study. Unfortunately, in light of the study's findings, it is worth considering whether conservation of self-control resources may have occurred, as participants were never informed of the purpose of looking at the neutral stimuli. It is probable that if some participants conceptualized the baseline task as necessary for a subsequent task, that they may have conserved that self-control resource

and not have persisted as long (Muraven, Shmueli, & Burkley, & 2006). One way to address this in the future would be to ask participants to rate how hard they worked on the task.

It is also worth considering the impact of the motivation for participants to continue to persist on a puzzle on which they had no success (Baumeister & Vohs, 2007; Muraven & Baumeister, 2000). The participants were working towards a value of three Sona credits, which may have had varying degrees of importance for each individual. It may be worth considering that individuals were unwilling to become distressed about completion. Similarly, they may have been less likely to attribute the lack of success to lack of effort. Perhaps participant reappraisal of the unsolvable task may have impacted expected symptoms related to a frustrating task (Martin & Dahlen, 2005). Similarly, some participants responded to the task by generating nonsense words in order to answer the questions. Others generated words without utilizing all the characters. This technique was not consistent with the rules, but participants may have seen this strategy as successful.

An alternative explanation, with regard to motivation, is the lack of rationale for how mindfulness may be helpful. Participants were not informed of the psychological and cognitive value of practicing mindfulness, and thus may have been influenced by established preconceptions or initial discomfort. The absence of rationale may not be consistent with real world applicability, as individuals may make informed decisions regarding whether to practice mindfulness or not. Further, this study did not include a method of assessing participant engagement with the task.

Another area to explore is the role of stereotype threat, the risk of confirming a stereotype about an individual's group as characteristic of self (Steele & Aronson, 1995). Although this phenomenon was not accounted for, it may provide important information about the participant's

experience. The task was described as a challenging puzzle; however, the anagram was presented as a complex cognitive task. As such, the perceived racial and ethnic perception of the researcher may have impacted how the individual experienced the task. A method for countering stereotype threat is by the presence of a competent individual or role model. Although this aspect of the study design was not controlled for, it may worth considering in light of the findings.

Furthermore, the unsolvable anagram was adapted for the present study and it was noted that several of the items selected from the measure used in previous ego depletion research (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven, Tice & Baumeister, 1998) were in fact solvable. Participants in the current study were given 10 newly selected anagrams confirmed unsolvable. Curiosity arises about whether or not the task used in previous findings yielded an impact due to the presence of solvable items. Perhaps the presence of feedback (i.e., successfully solving an anagram) may have reinforced participant persistence. For the purposes of this study, the lack of feedback allowed for the emphasis to be placed on the mindfulness manipulation. Individuals were therefore responding in accordance with self-control capacity rather than environmental contingencies. Nevertheless, it is important to consider the appropriateness of the task for ego-depletion research given that the description of the measure has been misrepresented.

The presence of manipulation checks provided information regarding participant process of the study; however, results were not conclusive. For instance, participants often marked ‘yes’, for awareness of insolvability, but would persist for the entire 30 minutes. One participant communicated, “I had a feeling it was, but I’m usually just bad at these.” It seems even if individuals suspected the task was unsolvable, some chose to persist, while others did not.

Perhaps a structured interview or a series of questions may have helped to elucidate the individual's approach.

Another limitation of the study was the arbitrarily selected time cap of 30 minutes, which may have limited the variability of persistence across conditions. Individuals in the study were asked to stop working on the unsolvable anagram task after they had persisted for the full 30 minutes. Possible implications of extending the time may have included possible distress and considerations of how aware individuals were of their freedom in choosing when to stop. This study may incite conversations regarding power differential effects. Although the study inadvertently created a ceiling effect in terms of persistence, it may have been unduly distressing to have had the participants persist for longer without success.

Future Directions

Although this study did not provide support for established hypotheses, it does raise questions about the internal process for participants and how it may have been impacted by newly established self-awareness. Coding of qualitative observations (e.g., time spent attending to task, written attempts, frustration behaviors) may have provided useful information about participant compliance with the task. Perhaps distinctions regarding level of investment for completing the task may have been beneficial in understanding differences between conditions. Further, future research should find a subjective self-rating of how depleted individuals feel intermittingly.

Another area for exploration includes the assessment of participant willingness to engage in another mindfulness experience and direct questioning regarding overall comfort with the task. More detailed assessment of past mindfulness practices in terms of longevity of practice, and appreciation and comfort with mindfulness practice would likely address how past

mindfulness experience impacted performance on the self-control task. If mindfulness is similar to a muscle, then continued practice with mindfulness is likely to be more resilient to ego depletion. Replication of this study after a one-day workshop on mindfulness may generate different results, as individuals would be informed of the value of mindfulness from a psychological and cognitive perspective; this brings a possibility of participants being more likely to engage fully in the practice.

In the event the baseline measure did serve to deplete individuals during the control condition, the introduction of a second measure of mindfulness, such as the Toronto Mindfulness Scale (TMS; Lau et al., 2006) may be useful in addressing changes as a result of completing the task or being asked to wait. The TMS measures current mindfulness traits, while the KIMS provides information regarding trait mindfulness. More information is needed to address what processes occurred in the present study. It would be additionally beneficial to explore how different mindfulness techniques may be important for different presentations of symptoms (Desrosiers, Klemanski, & Nolen-Hoeksema, 2013a). Undertaking further inquiry into the optimal methods of assessing these constructs is necessary to address what mindfulness has to offer for clients, and society at large.

Table 1

Visual Representation of Study Design

Condition	Measures						
Control	10-minute Baseline	KIMS	Wait for 10 minutes	Unsolvable Anagrams	AFQ-Y	DASS	Demographics
Mindfulness	10-minute Baseline	KIMS	10-minute Mindfulness Exercise	Unsolvable Anagrams	AFQ-Y	DASS	Demographics
Mindfulness + Expectancy (Instructions)	10-minute Baseline	KIMS	10-minute Mindfulness Exercise with Instructions	Unsolvable Anagrams	AFQ-Y	DASS	Demographics

Table 2

Sample Descriptive Statistics (N = 67)

	Frequency	Percent
Gender		
Male	18	26.9
Female	49	73.1
Transgender	0	0
Ethnicity		
White/Caucasian	29	43.3
Hispanic/Latino	20	29.9
Black/African American	6	9.0
Biracial	6	9.0
Asian/Pacific Islander	3	4.5
Other	2	3.0

(table continues)

Table 2

Sample Descriptive Statistics (N = 67) (continued).

Annual Income

Less than \$20,000	55	82.1
\$20,000 – \$50,000	5	7.5
\$50,000 – \$100,000	2	3.0
More than \$100,000	2	3.0

Education Level

Freshman	31	46.3
Sophomore	11	16.4
Junior	11	16.4
Senior	13	19.4
Post Baccalaureate	1	1.5

Table 3

Descriptive Statistics for Variables of Interest

Scale	<i>N</i>	Min. (observed)	Max (observed)	<i>M</i>	<i>SD</i>
KIMS – Composite	67	99	146	122.73	11.51
KIMS – Observing	67	27	52	38.60	5.86
KIMS – Describing	67	16	39	27.07	5.62
KIMS – Acting with Awareness	67	13	40	28.22	4.95
KIMS – Accepting	67	12	43	28.84	6.60
AFQ-Y – Composite	67	0	44	20.44	9.88
DASS – Composite	67	2.0	47.12	21.48	12.20
DASS – Depression*	67	0	5.20	2.20	1.37

(table continues)

Table 3

Descriptive Statistics for Variables of Interest (continued).

DASS – Anxiety	67	0	22	7.16	5.48
DASS – Stress	67	1.0	32	12.12	7.17
Time Persisted*	67	11.09	42.43	30.50	9.40

Note. KIMS = The Kentucky Inventory of Mindfulness Skills. AFQ-Y = Avoidance and Fusion Questionnaire - Youth. DASS = Depression Anxiety Stress Scales. * = variables have been transformed. DASS – Depression and Time Persisted are square root transformed.

Table 4

Summary of Correlations Among Variables of Interest Used in Analyses

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Time Persisted*	-													
2. Past Mindful. Practice	.13	-												
3. Hours Fasting	-.14	-.04	-											
4. Awareness Of Unsolv.*	.98**	.10	-.16	-										
5. Initial Confidence Rating	-.03	-.16	.18	-.02	-									
6. KIMS – Composite	.07	.10	.09	.09	.05	-								

(table continues)

Table 4

Summary of Correlations Among Variables of Interest Used in Analyses (continued).

7. KIMS – Observe	.14	.21	.19	.13	.12	.46**	-							
8. KIMS – Describe	-.11	-.02	.18	-.13	.19	.64**	.27*	-						
9. KIMS – Accept	-.09	-.06	-.06	-.05	-.19	.43**	-.39*	.05	-					
10. KIMS – Awareness	.25*	.07	-.16	.27*	.00	.49**	.09	-.04	.56	-				
11. AFQ-Y – Composite	.00	.08	-.07	-.03	.02	-.42**	-.02	-.10	-.42**	-.16	-			
12. DASS – Composite	.16	.18	-.02	.15	-.02	-.45**	.26*	-.08	-.45**	-.26*	.48**	-		
13. DASS – Depression *	.19	.21	-.07	.18	.11	-.44**	.36*	-.04	-.44**	-.09	.47**	.64**	-	

(table continues)

Table 4

Summary of Correlations Among Variables of Interest Used in Analyses (continued).

14. DASS – Anxiety	.11	.09	-.07	.12	-.01	-.28*	.24*	-.18*	-.48**	-.08	.38*	.86**	.45**	-
15. DASS – Stress	.15	.20	.02	.13	-.05	-.24	.19	.01	-.32*	-.36*	.44**	.92**	.55**	.61**

Note. KIMS = The Kentucky Inventory of Mindfulness Skills. AFQ-Y = Avoidance and Fusion Questionnaire - Youth. DASS = Depression Anxiety Stress Scales. * $p < .05$, ** $p < .001$. * = variables have been transformed. DASS – Depression and Time Persisted are square root transformed. Awareness of Unsolvability is log of total squares transformed.

APPENDIX
DEMOGRAPHICS QUESTIONNAIRE

1. Age (in years): _____

2. Sex:

- Male
- Female
- Transgender

3. Your current level of education is:

- Freshman
- Sophomore
- Junior
- Senior
- Post-Bachelor's degree
- Other, please specify _____

4. Your Ethnicity is:

- Asian/Pacific Islander
- Black/African American
- Hispanic/Latino
- Middle Eastern/Arab
- Native American
- White/Caucasian
- Biracial, please specify _____
- Other, please specify _____

5. Your approximate yearly income:

- <20,000
- 20,000-50,000
- 50,000-100,000
- >100,000

6. Have you practiced mindfulness before?

- No
- Yes, I've done this before
- I've done something similar (e.g., yoga, meditation, mindful walking, etc.)

↳ Please explain: _____

7. How long did you fast prior to participating in this study? _____ hours

8. Were you aware that the puzzles were unsolvable?

- No
- Yes

9. Please rate your initial confidence on solving the puzzles (1-5): _____

1	2	3	4	5
Very Low	Low	Neutral	High	Very High

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