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The Impact of a Mindful State on Ego-Salience and Self-Control

Robert J. Goodman
Cleveland State University

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ROBERT J. GOODMAN

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This thesis has been approved

for the Department of Psychology

and the College of Graduate Studies by

_____
Thesis Chairperson, Ernest S. Park

_____
Department/Date

_____
Conor T. McLennan

_____
Department/Date

_____
Andrew B. Slifkin

_____
Department/Date

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ROBERT J. GOODMAN

ABSTRACT

Convergent findings among several distinct lines of research have revealed that mindfulness, an open and receptive form of present-centered awareness, is positively associated with numerous indices of well-being. Much of this research has focused on dispositional mindfulness, the frequency with which one enters into mindful states over time. However, state mindfulness, the degree to which one is mindful at a specific point in time, has been left relatively unexplored. Current theories suggest that many beneficial effects attributable to mindfulness are due to changes in the way one relates to thoughts about the self. In this study we hypothesized that a heightened mindful state would reduce the salience of self-relevant concepts. Further, we hypothesized that this difference in cognitions would alter how people deal with self-threatening information and lead to advantages in one's ability to exert volitional control over subsequent behaviors. To test these hypotheses, all participants were told that we were measuring their personality traits to make predictions about their "sociability." After completing an initial battery of self-report measures, half of the participants underwent a 15-minute state mindfulness induction, while the other half received instructions to let their mind wander. Immediately afterward, a lexical decision task was administered which was designed to assess the salience of previously rated self-descriptive words. Each participant was then given a report that contained negative feedback about the future of his or her social life. Finally, participants completed a dichotic listening task designed to assess self-regulatory ability and a self-report measure sensitive to state affect. Our analyses indicated that the

mindfulness induction significantly reduced the salience of self-relevant cognitions and

that the degree of this change significantly predicted improvements in self-control.

Additionally, we found evidence that mindful people responded to self-threatening

information in a more adaptive manner.

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

For good reason, many psychological theories and frameworks center on understanding consciousness, or mental life. In fact, psychology has been referred to as the science of consciousness (Ornstein, 1972). James's *The Principles of Psychology* (1890) was a description of the conscious thinker, and in this work, the self was portrayed as having a variety of conscious aspects that were each "superficial, transient, taken up or dropped at will" (1890, p. 307). In his writings, James stated that the perceived essence of things, including the self, is heavily dependent on their properties relevant to the perceiver's current interests, goals, and desires in the present moment.

Over the years, theorists have focused primarily on studying self-reflexive forms of consciousness. Consciousness with this "self-reflexive quality" is characterized by the tendency for attention to be *directed* inward onto the self (or knowledge of the self) (Baumeister, 1999; Duval & Wicklund, 1972; Silvia & Duval, 2001). As such, one becomes the object of his or her own consciousness and enters a state of self-awareness (Baumeister, 1999; Brown, Ryan & Creswell, 2007a; Duval & Wicklund, 1972). A distinguishing feature of self-reflexive forms of consciousness (e.g., self-awareness, self-

consciousness, self-focused attention, self-monitoring) is the emphasis on the *control* of attention and awareness towards *self-driven* interests and goals (Brown et al., 2007a; Brown, Ryan & Creswell, 2007b). Awareness and attention operate in tandem with self-relevant cognitions to facilitate efforts to further integrate, expand, maintain or enhance personal identity and esteem, and to identify future self-relevant goals (and thus rewards) to be reached (Brown et al., 2007a). Thus, with reflexive forms of self-consciousness, the control of attention and awareness is often directed in ways that seemingly "best" serve the self.

Self-reflexive consciousness is certainly an integral aspect of human life. It is critical for generating self-knowledge and for developing and maintaining a sense of self. Unfortunately, other forms of consciousness have not received the same amount of attention, and thus, the potential benefits that accompany these states have not been as thoroughly explored. James (1902) recognized the wide array of mental experiences that humans have the capacity to engage in, as evidenced in his statement:

> *our normal waking consciousness, rational consciousness as we call it, is but one special type of consciousness, whilst all about it, parted from it by the flimsiest of screens, there lie potential forms of consciousness entirely different* (p. 378).

While James acknowledged the vast nature of consciousness, his interests and thoughts on the topic revolved around the nature of personal will and people's ability to transform intention into action through deliberate choice and focused self-directed attention. Since most research on consciousness has followed this path as well, a comprehensive understanding of consciousness remains elusive.

More recently, theorists have started to examine other forms of consciousness that are not self-reflexive. Instead of applying a framework that emphasizes the central

role that the self plays in mental life (e.g., self as actor or agent), this complementary

approach often focuses on how the quality of consciousness impacts the self (Ryan &

Brown, 2003). For example, there has been an increase in empirical work investigating

the relationship between well-being and one particular attribute of consciousness, called

mindfulness. Mindfulness is often described as "the state of being attentive to and aware

of what is taking place in the present" (Brown & Ryan, 2003, p. 822). In theory, during a

state of mindfulness people utilize the functions of consciousness differently, making it

distinct from self-reflexive consciousness (Brown et al., 2007a, 2007b). When mindful,

one does not *direct* attention inward upon the self, nor does he or she attempt to evaluate,

construct or elaborate upon mental representations of the self. Rather than perceiving

through the self-focused lens, the aim is to prolong that "fleeting moment of pure

awareness" (Gunaratana, 2002, p.138) where one observes the present as it is before

projecting his/her categorizations, conceptions, expectations, desires, and biases onto it

(Baer, Smith & Allen, 2004; Bishop, Lau, Shapiro, Carlson, Anderson, Carmondy, et al.,

2004; Brown et al., 2007a; Dimidjian & Linehan, 2003; Kabat-Zinn, 1990; Lau, Bishop,

Segal, Buis, Anderson, Carlson, et al., 2006; Teasdale, 1999). In a state of mindfulness

one does not set out or attempt to accomplish any goals aside from maintaining the

clearest awareness of the present moment (Gunaratana, 2002). Thus, mindfulness is

understood to foster an "unbiased receptivity," (Brown et al., 2007a, p. 213), "non-

elaborative awareness" (Bishop et al., 2004, p. 234), or "egoless alertness" (Gunaratana,

2002, p. 152), resulting in a more empirical view towards the data of immediate

experience (Brown et al., 2007a). Over time, the thoughts of a mindful person are less

likely to be altered by personal beliefs and biases that are not supported by objective

evidence (Bishop et al., 2004; Brown et al., 2007a; Herndon, 2008; Martin, 1997; Ryan & Brown, 2003).

The aim of the present research is to contribute to our current understanding of mindfulness by exploring various ways in which a mindful state can impact cognitions, affect, and self-control. More specifically, we are interested in how a lab-induced mindful state will impact the salience of self-relevant cognitions, one's response to self-threatening information, and subsequent attempts to self-regulate behavior. In an attempt to describe the nature of mindfulness and how it relates to these other variables in more detail, the following sections will outline the ways that mindfulness has been characterized and how it relates to cognitions, self-regulation, and affect.

1.1 Mindful Attention, Awareness and Cognition

Broadly speaking, mindfulness consists of: (1) an increased capacity to deploy, maintain, and reorient attention and awareness to the unfolding of present experiences, and (2) systematic changes in psychological tendencies that alter the nature of one's subjective experience. Mindfulness has a prereflexive quality such that the contents of awareness are not initially construed through the framework of personal experience and well-established mental representations (Brown & Ryan, 2007a; 2007b; 2003; Levesque & Brown, 2007). Instead, when in a state of mindfulness one maintains a bare registration of present-moment internal and external experiences as they occur, before self-focused consciousness intervenes and categorizes the perceived stimuli (Bishop, 2002; Brown et al., 2007a; Brown & Ryan, 2003; Epstein, 1995; Goleman, 1980; Kabat-Zinn, 1990; Martin, 1997; Nanananda, 1997; Nyanaponika, 1962; Shapiro, Carlson, Astin & Freedman, 2006).

Once aware of an object, the automatic tendency for most people is to categorize and conceptualize about it (Gunaratana, 2002; Toneato, 2002). However, perception in a mindful state is pre-symbolic or pre-conceptual, occurring before the mental proliferation of ideas and concepts (Brown et al., 2007a; Gunaratana, 2002; Nanananda, 1997). By looking at the bare contents of attention and awareness without imposing past distinctions, one should be able to engage and disengage in mental activity with more volition (Brown et al., 2007a; Levesque & Brown, 2007), associating mindfulness with "improvements in cognitive inhibition" (Bishop et al., 2004, p. 233). Rather than controlling attention and awareness towards self-relevant interests and goals, enhancement of the quality of awareness itself becomes the goal, resulting in a more accurate and objective account of the present. Consequently, as mindfulness increases, the salience of a personal identity or ego should decrease, rendering one less egocentric and less likely to engage in (now) irrelevant processes like self-evaluation or self-enhancement (Carson & Langer, 2006; Djikic & Langer, 2007; Leary & Tate, 2007; Ryan & Brown, 2003).

This shift away from reflexive processing toward a reflective, present-centered focus on experience changes the way one relates to their perceptions, emotions and thoughts. Essentially, one personally identifies with their experiences less. For example, when a negative thought arises, rather than experiencing it as an inescapable fact of a fixed, static self ("I am a loser"), or of reality, one is able to observe it with some mental distance and see thoughts as thoughts, transient mental events which may or may not be correct (Baer et al., 2004; Bishop, 2002; Bishop et al., 2004; Brown & Ryan, 2003; Chambers, Lo, & Allen, 2008; Kabat-Zinn, 1990; Ortner, Kilner, & Zelazo, 2007;

Teasdale, 1999; Teasdale, Moore, Hayhurst, Pope et al., 2002). This orientation toward the contents of awareness indicates a change in cognitive set which has been called *decentering* or *dis-identification* (Bishop et al., 2004; Brown et al., 2007a; Teasdale et al., 2002). When one is in a decentered, mindful state it has been hypothesized that the control of attention is driven proportionally less by self-relevant cognitive processes and more by awareness itself (Brown et al., 2007a).

Mindfulness has also been characterized as bringing a "clarity of awareness" to one's experiences as they exist moment-to-moment (Brown et al., 2007a, p. 213). This orientation is often called *shoshin*, or *beginner's mind* (Suzuki & Dixon, 1999) because the contents of awareness are examined with a sense of curiosity, as if they are completely new and being examined for the first time with less reliance on distinctions made in the past (Bishop et al., 2004; Dimidjian & Linehan, 2003; Gunaratana, 2002; Langer & Moldoveanu, 2000; Leary, Adams, & Tate, 2006; Rothwell, 2006). Rather than being carried away from the flow of present experience by cognitions concerning the past or future, a mindful orientation is taken when one actively engages life in the immediacy of present experience (Brown & Ryan, 2003; Brown et al., 2007a). There are many benefits when one turns attention away from the past and future to focus on the present in this way, and for this reason mindfulness training aims to habituate people into adopting this present-centered perspective. Many of the negative, destructive, and counter-productive states associated with self-concerns—embarrassment, guilt, shame, fear, anxiety, anger, hate, uncertainty—emerge when a temporal perspective (past or the future) is applied. This is not to say that mindful people never experience self-concerns, but that when they arise one with a mindful orientation is not as enchanted or threatened

by them and is less likely to be carried away in their grip (Arch & Craske, 2006; Brown, Ryan, Creswell & Niemiec, 2008; Kabat-Zinn, 1990; Teasdale, 1999; Teasdale et al., 2002).

While consideration about the past and future certainly serves adaptive purposes, for example, to protect and enhance the personal identity, these types of cognitions filter and obstruct our experience of the present and distort our perspective of reality as it is happening. People are motivated to maintain positive self-perceptions and dismiss and disconfirm negative self-perceptions (Leary, 2004; Miller & Ross, 1975; Taylor & Brown, 1988). These motives systematically guide cognitive activity (Leary, 2004). People are most likely to engage in motivated processing when current situations are experienced within the context of a continuous temporal framework that encompasses the past, present, and future. It is in activating thoughts of the past (or future) that one generates standards to live up to. Arguably, if mental life was experienced such that the focus was primarily on the present moment alone, then self-standards would not be applicable nor activated, allowing one to process information in a more objective fashion. Ultimately, if a characteristic feature of mindfulness is an enhanced clarity of the present, then the role of the self must be minimized so objectivity can be obtained. Further, the activation of concepts (e.g., past and future) that inherently highlight the existence of a stable, goal-oriented self will be an obstruction.

Imagine one has previously excelled in academics and now considers this a self-defining domain, integrating the characteristic "intellectual" into his or her self-concept. If this is a positive and central aspect to one's identity, then feedback that potentially threatens this identity is likely to be interpreted in a biased, defensive fashion so that a

positive sense of self can be maintained. Self-serving attributional biases exemplify these dynamics. A number of studies demonstrate that when people receive negative performance feedback in an important domain, they often attribute their failure to external rather than internal sources (e.g., the test was unfair) (Carver, De Gregorio, & Gillis, 1980; Miller & Ross, 1975; Sedikides, Campbell, Reeder, & Elliot, 1998). Self-handicapping strategies serve a similar function, and help to maintain a positive sense of self when failure or negative feedback is likely (Baumgardner, Lake & Arkin, 1985; Tice & Baumeister, 1990; Zuckerman, Kieffer, & Knee, 1998). In much of this work, mental processes are presumed to be "biased" because the interpretation of the situation varies depending on the positive or negative valence of the outcome. If processing was objective, the valence of the outcome should have little to no impact on one's assessments. Importantly, what areas of research like this demonstrate is that when self-concerns are activated, self-relevant goals (e.g., maintain positive self-esteem) take precedence over other ideals (e.g., objectivity, accuracy) and are more likely to guide information processing.

With mindfulness, self-concerns and biases are minimized because the notion of self holds little relevance to current processing objectives. Consequently, some of the mental activities that one typically engages in or has to be concerned with (e.g., self-presentation concerns, dissonance reduction) no longer become necessary when one is in a mindful state. Presumably, being free of these psychological constraints allows one to be more capable and effective at regulating attention, affect, cognitions, and behaviors. Support has been found for these claims. In one study (Wenk-Sormaz, 2005), mindfulness was associated with better performance on the Stroop task (Stroop, 1935), demonstrating

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heightened abilities to disengage from habitual tendencies and to adjust in situations where cognitive interference typically impairs performance.

Another study found that mindfulness was associated with non-directed attention and an enhanced state of awareness using an eye-tracker (Anderson, Lau, Segal, & Bishop, 2007). Participants with a higher degree of mindfulness were able to more accurately identify objects in unexpected contexts, indicating that one's preconceptions or expectations guide attention and awareness less when one is mindfully aware. Mindfulness has also been associated with higher thresholds of schema activation and a reduced tendency to perpetuate illusory correlations and ignore supportive evidence from the environment (Herndon, 2008). In sum, mindfulness is likely to increase attention to and awareness of the present moment while reducing the self-relevant cognitive processes that often serve to bias, distort, or interfere with our experience, perception, and interpretation of the world.

1.2 Self-Regulation and Ego-Depletion

With the growing interest in mindfulness, successful applications of mindfulness training are being documented at an increasing rate. For example, mindfulness training has been effectively used to help people gain control over various addictions (Bowen, Witkiewitz, Dillworth & Marlatt, 2007; Davis, Fleming, Bonus, & Baker, 2007; Marlatt, 2002; Lakey, Campbell, Brown & Goodie, 2007), and has been applied in therapy to help clients break free from unwanted cognitive and behavioral tendencies (Baer, 2003; Kabat-Zinn, 1990; Segal, Williams & Teasdale, 2002;). The concept of mindfulness shares some inherent similarities with another rapidly growing topic in psychology--self-regulation. Self-regulation refers to the process and ability to control behavior and keep it

on track in the pursuit of goals (Baumeister & Vohs, 2007). It is primarily understood as the exertion of effort, or control, by the self to alter internal states and behavior. Early research on self-regulation focused on the control of thoughts, emotions, impulses, appetites, and task performance. The concept of self-awareness was eventually integrated into the framework of self regulation to explain basic underlying mechanisms that guide behavior toward goal states (Baumeister & Vohs, 2007; Carver & Scheier, 1981). This view emphasizes the centrality of *monitoring* the present state of the self, comparing this perceptual input to one's self-relevant goal state, and subsequently utilizing effort or *control* to increase or suspend behaviors to approach a set goal state (or avoid an anti-goal state). Successful self-regulation consists of reducing the discrepancy between the present state and a positive goal state (or increasing the discrepancy between the present state and an anti-goal state).

Discrepancies are tightly linked with our experience of affect. Positive affect often signals that a goal has been satisfied, indicating a reduced necessity for the future exertion of control toward the given goal and the freedom to transition to other unmet goals (coasting). Negative affect, on the other hand, signals the need to exert more self-control, so relevant behaviors are directed towards or away from the desired or undesired end state. Consequently, the more a person is aware of internal states, the better one can detect present-state/goal-state discrepancies (or their affective feedback), making one more suited to deploy appropriate self-control processes. Thus, the deployment of attention and awareness is widely considered a precondition for effective self-regulation because one must be aware of internal and external states in order to utilize the basis of self-knowledge needed to set and accomplish self-congruent goals.

When people self-regulate they exert control over their behavior to override habitual and automatic ways of responding in favor of more deliberate, volitional responses. The exertion of self-control requires willpower and effort to sustain consistently. Much like a muscle, the successful deployment of self-control relies on the availability of a common pool of self-regulatory energy resources (Baumeister, Heatherton, & Tice, 1993; Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Vohs, & Tice, 2007; Vohs, Baumeister, & Ciarocco, 2005). The amount of resources available to a person at a given point in time represents their level of self-regulatory strength.

Evidence has shown that as resources are depleted, a process called "ego-depletion," one's ability to engage in controlled, volitional thought and action becomes more difficult (Baumeister et al., 1998). Since regulatory resources are required to fuel controlled processes, as resources diminish the ability to effectively self-regulate diminishes as well. Consequently, depletion often leads one to rely more upon automatic and heuristic processes, which require less effort and are not resource dependent, to direct thought and behavior until resources are replenished. Take for example, a student who spends a substantial period of time exerting control over their behavior to study for and take an exam. After the exam, this student would feel exhausted, and would consequently be less able to exert control over future behaviors. So if the student is on a diet and typically engages in controlled actions such as thought suppression (e.g., don't think about food or hunger), he or she will have more difficulty inhibiting these unwanted thoughts following a lengthy and taxing exam. This would result in increased temptations and increase the probability of binging or straying from one's diet. Similarly, if a person

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is trying to quit smoking, she might engage in thought suppression and avoid thoughts related to cigarettes and cravings. In general, she might be successful at self-regulating if other aspects of her life are not too demanding. However, theory would predict that if she recently learned bad news (e.g., you might have cancer) and chooses to channel her regulatory resources towards some other goal, such as suppressing this upsetting information, then she will be less effective at regulating other controlled behaviors (e.g., suppressing thoughts of cigarettes). Ironically, this negative news would likely instigate a chain of events that would actually increase her desire to smoke a cigarette.

There is converging evidence from a number of studies that all suggest that ego-depletion occurs as one engages in self-regulation (Baumeister et al., 2007; Baumeister et al., 1998; Tice, Baumeister, Shmueli, & Muraven, 2007; Vohs et al., 2005). The more that one has to exert effort and control (self-regulation), the more depleted one becomes (ego-depletion). Regardless of why the task is demanding (complexity; novel; atypical), as one uses resources fewer are available for subsequent use. For example, presenting oneself to others in an atypical manner has been shown to deplete regulatory resources, resulting in poorer performance on subsequent tasks (Vohs et al., 2005). In a related study, participants were instructed to eat as many raw radishes as they could within a five minute period. While doing this, they were also instructed not to eat any of the fresh baked, enticing, chocolate chip cookies that were placed next to them (Baumeister et al., 1998). In another condition, participants were told to eat as many cookies as they could, while refraining from eating any of the radishes placed next to them. Since it is not too demanding to make oneself eat cookies and deny oneself the pleasure of eating raw radishes, participants in this condition were not expected to engage in self-regulation,

while the former condition was designed to require more regulation and thus, more depletion. Results from this study show that participants who were asked to eat radishes did in fact perform worse on subsequent tasks that were complex and required effort.

As stated previously, regardless of the domain or reason, the more people engage in self-regulation the more depleted they become. When participants are motivated by performance contingent extrinsic rewards their resources are depleted more heavily than when intrinsically motivated (Muraven, Rosman & Gagne, 2007). When people feel "forced or controlled" to perform an undesirable task, they will exert more effort and expend more regulatory resources to "overcome internal resistance" than when individuals are intrinsically motivated and autonomously exercise self-control (Muraven, et al., 2007). Resources are also depleted when an individual attempts to suppress thoughts or the expression of affect (Baumeister et al., 1998; Muraven, Tice, & Baumeister, 1998; Tice et al., 2007; Vohs et al., 2005), and at other times when they evoke control processes to override automatic ways of responding, such in the Stroop paradigm (Muraven et al., 2007; Vohs et al., 2005; Webb & Sheeran, 2003).

1.3 The Present Research

Reflexive self-consciousness involves the deployment of self-relevant cognitive processes as a means to control attention and awareness towards goals set for and by the self (Brown et al., 2007a; 2007b). In contrast, prereflexive self-consciousness implies shifting resources away from control processes in favor of monitoring processes. In other words, the motive driving a prereflexive mode of self-awareness is to gather objective data from present moment experiences. To this end, biasing attention towards stimuli that are relevant to the self is a hindrance. Thus, a prereflexive mode of self-consciousness

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can be measured by assessing the influence that self-relevant cognitive processes have over the deployment of attention. Specifically, as mindfulness increases, self-relevant cognitive processes should become less salient and the deployment of attention should be less biased in favor information associated with enhancing or maintaining the personal identity and its goals.

As attention is released from the control of abstract self-related patterns of thought, self-concerns, and thoughts about the past and future will be reduced. Once self-concerns are relegated they should interfere less with one's ability to monitor information from the present (Bishop et al., 2004; Brown et al., 2007a; Heppner & Kernis, 2007; Leary et al., 2006). Interestingly, self-relevant negative feedback has been shown to adversely affect one's ability to exert willful control over their behavior (Baumeister, Dewall, Ciarocco, & Twenge, 2005). More specifically, participants who receive negative feedback soften the impact of self-threats by avoiding self-awareness, a component that is required to regulate behavior successfully. Mindfulness has been positively associated with self-awareness (Brown & Ryan, 2003) and with more adaptive responses to situations where the personal identity is threatened (Brown et al., 2008). Rather than avoiding self-awareness, the impact of self-threatening information should be softened for mindful people through their decentered orientation. Put another way, because the salience of self-representations are reduced in a state of mindfulness, ego-threats are less disturbing. Consequently, one's ability (or willingness) to volitionally control behavior following self-threatening negative feedback should increase as a function of mindfulness ability. While these types of predictions are consistent with descriptions of mindfulness, they have not yet been tested empirically.

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Therefore, the present study will focus on testing two primary hypotheses: 1) As state mindfulness increases, self-relevant cognitive processes should become less salient and the deployment of attention should be less biased to favor self-relevant information; and 2) After receiving self-threatening negative feedback, mindful individuals will be more capable of deliberately controlling their behavior.

CHAPTER II

METHODS

After completing a short series of individual difference self-report measures we induced a mindful state in half of our sample, while the other half (controls) were instructed to let their mind wander. Next, participants completed a few self-report measures sensitive to state variations in mindfulness. Immediately afterwards, all participants completed a lexical decision task that was designed to assess differences in the salience of previously rated self-descriptive words. The intended purpose of this measure was to determine whether state mindfulness caused measurable changes in ego-salience. Next, participants received a report that contained self-threatening information about the future of their social life, which past studies have used to cripple one's ability to engage in self-regulation. Then participants completed a dichotic listening task that was designed to measure their ability to exert self-control and a self-report measure of their current affective state. The purpose of these final two measures was to assess how changes in state mindfulness and ego-salience impact the way threatening information is dealt with and subsequent attempts to exert self-control. We expect that state mindfulness will function to mitigate self-relevant thoughts and thus, reduce the perceived importance

of the self-threatening information. Following this logic, we suggest that mindful people will be more capable of engaging in self-regulation and will be less likely to engage in maladaptive strategies (ie., suppression) to deal with the threat.

2.1 Participants

Participants consisted of 104 Cleveland State University undergraduates (68 females and 36 males) who were right-handed, had no hearing impairments and were not allergic to raisins. Each student participated to partially fulfill a research participation requirement for an undergraduate Psychology course. The project was approved by the University's Institutional Review Board and was executed in accordance with their suggestions and requirements. Each participant was instructed to read and complete an Informed Consent form that outlined their rights as a research participant before beginning the experiment (See Appendix D.1).

2.2 Design

All participants were randomly assigned to one of two possible conditions (state mindfulness induction X control induction) using a double-blind experimental design. All participants were completely naïve to the intended purpose of either induction procedure. Both conditions underwent an uninterrupted 15-minute 2-component activity designed to either increase their attention and awareness to the present moment (state mindfulness induction), or to increase their awareness of the future and/or past (control induction).

2.3 Procedure

2.3.1 Cover Story

Each participant was run in isolation and told an elaborate cover story explaining that the aim of the study was to assess their personality traits and to isolate factors that

might help or hinder the ability of psychologists to predict sociability (See Appendix C.1). Once the participant understood the (false) aim of the study they completed an informed consent form and were given a vague description of the tasks that they would be performing exactly as follows:

> *First you will answer some survey questions on the computer that assess some of your personality traits. Next, you will be relocated to a different area where you will follow instructions given over a pair of headphones. After that you will go back to the original computer, complete a few quick survey questions and complete a short word game. Then you will get a short break. We have found in previous hour-long studies that the data we collect gets rather unreliable about 2/3 the way through because people get tired. So… we give you the opportunity to relax and catch your breath. However, we also attempt to answer some of the over-arching questions we get regarding our research. Everyone seems to ask 'what are my personality traits like?' or 'what predictions would you make about me?' So, we will use this break to provide you with some feedback. We will print a 'Session Overview' report that contains an assessment of the data that we have collected up to this point. I will briefly go over how to interpret the report and will leave it with you to review for the next few minutes or so. After that there is another activity using the headphones, a few more survey questions, and then you will be good to go.*

This use of deception was implemented to ensure that participants would remain naïve to the purpose of the manipulation and to enhance the believability of negative feedback they would eventually receive.

2.3.2 Individual Difference Measures

After this general overview the participant was assigned to a PC-type computer running MediaLab 2008 research software (Jarvis, 2008a) upon which they completed a battery of self-report measures sensitive to individual differences. The first scale administered was always the IPIP extraversion scale (Goldberg, Johnson, Eber, Hogan, Ashton et al., 2006; See Appendix A.1). The only purpose of including this scale was to ensure that the cover story and negative feedback were convincing. Beyond this aim, extraversion had no importance to the present study. The second measure administered

was a self-relevant word rating task that we developed to assess the degree to which person-descriptive adjectives were considered self-characteristic. The purpose of this measure was to determine words which would be most closely associated with a participants' mental representation of self (See Appendix A.1). Upon completion of these initial 2 measures, two scales sensitive to dispositional mindfulness were administered using between scale randomization.

IPIP Extraversion Scale (IPIP-EXT; Goldberg, Johnson, Eber, Hogan, Ashton et al., 2006). This 10-item scale is an adaptation of the NEO Domain Extraversion from the International Personality Item Pool. It uses a 5-point Likert scale (1 = very inaccurate to 5= very accurate) to measure extraversion (See Appendix A.1).

Self-Relevant Word Rating. This task instructs participants to rate 20 person-descriptive adjectives ("Clever", "Practical", "Quiet") ranging from 'Not descriptive of me at all' to 'Extremely descriptive of me' on a 5-point Likert scale (See Appendix A.1). Word selection began with a pool of 844 person-descriptive adjectives (Dumas, Johnson, & Lynch, 2002). These words were subsequently included in a lexical decision task, so this list was pared down to 20-items based on lexical properties (which will be discussed in more detail later) using the MRC Psycholinguistic Database (Wilson, 1988).

Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). The 15-item MAAS items were designed to assess individual differences in dispositional mindfulness (See Appendix A.1). In other words, it captures the frequency with which individuals enter into mindful states over time. It is focused on the presence or absence of attention to, and awareness of, what is occurring in the present rather than on the various subjective orientations toward experience that are often associated with mindfulness (e.g.

acceptance, empathy, non-judgment, curiosity). Several independent analyses attest to the construct validity and unidimensional factor structure of the MAAS (Carlson & Brown, 2005; Cordon & Finney, 2008; MacKillop & Anderson, 2007).

Cognitive and Affective Mindfulness Scale Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007). This 12-item scale is sensitive to "attitudes and approaches towards internal experiences of emotions and thoughts" indicative of a mindful orientation and captures the tendency to approach internal experiences in a mindful ways across situations. (See Appendix A.1).

The authors attempted to infer a single high-order factor of mindfulness that measures a four factor conceptualization consisting of Attention, Present Focus, Awareness and Acceptance. However, due to issues regarding construct contamination, the authors suggest using an alternative 10-item composite when assessing dispositional mindfulness in relation to worry and anxiety. The authors also suggest that removing the Acceptance component of the scale would result in a measure of dispositional mindfulness more theoretically related to the MAAS. Because the conceptualization of mindfulness used in the present study doesn't include acceptance, we computed a 7-item composite that contained each of the Attention, Present-Focus, and Awareness items, but lacked the Acceptance component.

2.3.3 Manipulation

Upon completion the PC prompted the participant to raise their hand (to notify the experimenter) and required the experimenter to enter a password to proceed. At this point participants were relocated to a separate induction area within the same room (See Appendix E). They were seated at a table located in the corner of the room facing a plain

white wall. On their left side was a wall and on their right was a privacy divider which blocked their view of the rest of the room. Located on the table in front of them was a pen, a blank piece of white paper, a pair of circumaural headphones, and a small box of raisins. Once the participant was situated in the induction area, the experimenter would enter the password on the participants PC, which would load a screen with a script detailing instructions to be read to the participant. Each participant was walked through a volume adjustment process to ensure that it would be a comfortable experience. In an attempt to eliminate any potential disruption that would alter the induction experience, the experimenter asked each participant if they needed to "use the restroom or excuse themselves for any reason before beginning this next portion of the experiment". Next, the participant was told that a voice on the headphones would guide them through what they should do next. They were asked to pay careful attention to the instructions at all times and were told that the accuracy of their results depended on their compliance to this request. Finally, the participant was asked to wear the headphones and follow the instructions given by the audio recording.

The induction was administered by playing a digital audio recording over headphones for three primary reasons. First, we wanted to ensure that the induction procedure was administered in a consistent way across participants. Second, the use of digital recordings allowed us to manipulate the audio such that differences between the control and state mindfulness inductions could be minimized. The audio file for each condition was heavily edited to ensure that the recordings were as identical as possible. The control and state mindfulness induction recordings were spoken by the same male speaker and were each exactly 15 minutes and 22 second in duration. Third, we hoped

that headphones might reduce factors (i.e., noises) that could potentially distract the participant from the task.

As stated previously, both conditions underwent an uninterrupted 15-minute 2-component activity designed to either increase their attention and awareness to the present moment (See Appendix C.2), or to increase their awareness of the future and/or past (See Appendix C.3). The first induction component involved using the pen and piece of paper on the table (See Appendix E). After a brief introduction by the speaker, participants in the state mindfulness condition were guided through the process of mindfully drawing a straight line on a piece of paper for 5 minutes. They were given the following instructions (see Appendix C):

> *Slowly, pick up the pen on the table in front of you and pay close attention to my instructions. In a moment, I would like you to start drawing a horizontal line on the sheet of paper in front of you. Please draw as slowly as you possibly can. While you draw the line, focus on how the pen feels in your hand, and the sensation of slowly, steadily pushing the pen along. Do your best to stay focused on the immediate experience of drawing the line. If you lose focus, or begin to daydream, even the slightest amount, stop, make a quick slash mark through the line you are drawing, begin again exactly where you left off, and redirect your attention back to the immediate experience of drawing the line.*

This first component of the mindfulness induction provided us with tangible evidence that the participant was indeed listening to the instructions. In addition, we sought to explore whether the number of slashes a participant drew would be associated with variations in mindfulness. On one hand, the number of slashes could indicate the instability of their attention and thus, be negatively associated with mindfulness. On the other hand, it could be positively associated with mindfulness, indicating a participant's ability to detect and reorient their attention when it has wandered. Both of these skills are developed through mindfulness practice and are crucial to establishing deeper states of

mindfulness.

The first component of the control induction was identical in duration, but participants were given this alternative set of instructions (see Appendix C.3):

Slowly, pick up the pen on the table in front of you and draw whatever comes to mind. Allow your thoughts and feelings to take their own course, and follow them wherever they wish to go. Daydream freely.

For the second component of the state mindfulness induction each participant was walked through the process of mindfully eating a raisin (See Appendix C.2). This procedure was adapted from Kabatt-Zinn's (1990) Mindfulness-Based Stress Reduction program. Participants were asked to bring their attention to seeing the raisin and to "observe it carefully, as if they have never seen one before." They were be instructed to slowly pick it up and notice the sensations involved in moving their body, and in feeling the texture of the raisin. They were asked to observe any thoughts or feelings, such as like or dislike, that arose when observing the raisin. Then they will be guided through the process of smelling and chewing the raisin. Instructions will be given to pay particular attention to the automatic impulse to swallow. Once the participant has been walked through the process of eating one raisin mindfully, they are walked through the identical instructions a second time.

The second component of the control induction instructed participants to relax, when to eat a raisin (using the same duration between raisins as the state mindfulness induction), to "allow their mind to wander wherever it wished to go" and to "daydream freely" (See Appendix C.3). In the same manner as the state mindfulness induction, these instructions were repeated after five minutes.

Both components of the state mindfulness induction shared a solitary goal—to keep the participant attentive and aware to the flow of present experience. We did not seek to evaluate differences in the efficacy of the two induction components. Given the nascence of such induction procedures and the lack of reliable indices sensitive to subtle state variations in mindfulness, this was beyond the scope of the present study. However, this is a very interesting and important question which deserves serious empirical attention, particularly as research utilizing these techniques become more commonplace.

2.3.4 State Measures

At the fifteen minute mark both induction procedures instructed the participant to return back to the computer where they immediately completed two short self-report measures sensitive to state variations in mindfulness (See Appendix A.2). These scales were used to assess changes in mindfulness that the induction procedures caused in participants. In addition, we asked four questions about their experience eating raisins (See Appendix A.2). These items were presented in a between scale randomized order.

State Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003, Study 4). This scale consists of 5-items adapted from the MAAS and has been shown to reliably tap into fluctuations in mindfulness at the momentary level. Further, scores on this scale are positively associated with dispositional mindfulness as measured by the MAAS, indicating that individuals who enter into mindful states more frequently throughout the day have higher dispositional mindfulness scores, and vice-versa.

Toronto Mindfulness Scale (TMS; Lau et al., 2006). This 13-item scale assesses aspects of a mindful *state* that immediately proceed from mindfulness meditation practice. It has two subscales. The *Curiosity* subscale reflects an attitude of wanting to

learn more about one's experiences, while the *Decentering* subscale reflects a shift from identifying personally with thoughts and feelings to relating to one's experience in a wider field of awareness. There seems to be some conceptual overlap between the MAAS (Brown & Ryan, 2003) and the *Curiosity* factor of the TMS (Bishop et al., 2004) which suggests that these factors are each measuring a very similar construct, but from unique perspectives. While the MAAS is an index of one's disposition towards being aware and attentive to present experiences and events, the *Curiosity* factor of the TMS might measure the subjective state that results from being attentive and aware.

2.3.5 Lexical Decision Task

After completing the two scales the participant completes a lexical decision task on the same computer. Participants were be presented with a series of letter strings and asked to respond by answering whether or not a given string represented an English word as quickly and accurately as possible. The lexical decision task was administered using MediaLab 2008 in conjunction with the DirectRT 2008 software package (Jarvis, 2008a, 2008b). Three distinct categories of stimuli were used. The first category consisted of the 20 person-descriptive adjectives that had been used earlier in the self-relevant word ranking task. Using the MRC Psycholinguistic database (Wilson, 1988), each word in the person descriptive category was matched with a neutral adjective ('stale', 'worse', 'infinite'), which collectively formed the second category of stimuli words. Matches were made on a word-by-word basis such that concreteness, familiarity, log of frequency, number of letters, and mean reaction time in a lexical decision task, were practically identical for each person-descriptive adjective and its matched neutral adjective. A independent samples *t*-test was performed across the person-descriptive and neutral

stimuli categories to ensure that no significant difference existed on each lexical property (See Appendix B.2). Our intention was to reduce any potential differences across words that might affect reaction time so that we could measure differences between words that had been previously rated as self-descriptive and their matches in the neutral category. The third category consisted of non-word letter strings that syntactically resembled English words ('duftal', 'growgned', 'knif').

Each participant responded to all 20 items in each of the three stimuli categories. Each stimulus was presented individually, using within and between category randomization. All stimuli appeared in the center of the screen in 32-point white text-color Arial font against a black background. Participants were instructed to hit the "m" key on the keyboard if the string of characters represented a word, or the "n" key if it represented a nonword. While all participants were right-handed, we explicitly asked them to use only their right hand when responding. Each letter string remained on the screen until a response was detected, at which point the word disappeared and was replaced by a fixation cross (+). The fixation cross would remain on the screen for 750ms, after which the next stimulus was presented. Participants were walked through a practice block of 100 items before they began the actual task.

In lexical decision tasks the length of time it takes for a subject to respond to the stimuli is dependent upon the mental accessibility and lexical characteristics (concreteness, imaginability, familiarity) of the stimuli presented. Thus, if one found that the reaction time for a given person-descriptive word was slower than the reaction time to its match in the neutral category, this would indicate that the person-descriptive word was less salient. Using this approach, we can combine items in the person-descriptive

category based on their self-relevance ratings (from the self-relevant word rating task) and examine the differences in reaction time for words at each rating level of self-descriptiveness against their neutral matches. This will allow us to infer differences in the salience of self-relevant thoughts. Our hypothesis was that self-relevant cognitions would be less salient for mindful participants. In other words, people in the mindfulness induction condition should respond more slowly (greater reaction time) than controls to words previously ranked as self-descriptive relative to their neutral matches.

2.3.6 Negative Feedback

Upon completion of the lexical decision task, the computer prompted instructed the participant to notify the experimenter, and required the experimenter to enter password to proceed. After the experimenter entered the password each participant was told that computer was analyzing their data and would print out a report containing their results. A DOS window appeared on the screen after the password was entered which made it appear that the computer was connecting to a "Psychometric Analysis Server", performing a detailed analysis on their data, and sending a report from the analysis server to a printer connected to the participant's computer (See Appendix E). However, no analysis server actually existed (the computer was not connected to a network) and no analysis was performed. The purpose of this window was to further increase the believability of the negative feedback report. Once the faux analysis completed running, the report containing negative feedback printed immediately (See Appendix B.1). The experimenter took the report and directed the participant to a table located with the same room. Sitting across from them, the experimenter read from a script, and explained how to interpret the contents of the report using extraversion as an example (See

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Appendix C.4). The experimenter reminded each participant that all their information was confidential, walked them through the interpretation of their extraversion score, gave a brief description of extraversion, verified that the participant believed the extraversion score was accurate, identified what the other areas of the report meant, and left them to review it alone for a few minutes. In line with previous studies that incorporate negative feedback (Baumeister et al., 2005; Twenge, Baumeister, Tice & Stucke, 2001), we used their actual extraversion score when walking the participant through interpreting the report to bolster the participant's confidence in the accuracy of the other personality traits (abstractedness, emotional stability, dominance) that we never actually measured. Every participant received identical scores for each trait besides extraversion.

The negative feedback component appeared in the lower left hand corner of the report, in a box titled "Sociability Regression Forecast [Extraversion]: Type 32." The box contained a (fake) prediction about the future of their social life. This self-threatening feedback, which has been used in prior social exclusion research (Baumeister et al., 2005; Twenge et al., 2001), would adapt slightly to account for the participant's age and relationship status. However, the central thrust of the feedback was consistent for everyone, and stated:

> *You're the type who will end up alone later in life. You may have friends and relationships now, but by your mid 20s most of these will have drifted away. You may even marry or have several marriages, but these are likely to be short-lived and not continue into your 30s. Relationships don't last, and when you're past the age where people are constantly forming new relationships, the odds are you'll end up being alone more and more.*

A prior study which used this negative feedback found that people tend to numb, or suppress this information as a self-protective strategy. More specifically, people reduce their degree of self-awareness, which subsequently hinders their capacity, or willingness,

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to engage in tasks that require self-control (Baumeister et al., 2005; Twenge et al., 2001). We were interested in whether the state mindfulness induction might lead people to approach this information more constructively. In other words, will people higher in state mindfulness continue to use this numbing strategy?

2.3.7 Dichotic Listening Task

After reviewing the negative feedback each participant was immediately directed back to their PC to perform a "listening game". A dichotic listening task was administered using DirectRT (Jarvis, 2008b) in conjunction with MediaLab (Jarvis, 2008a) to assess their ability to engage in self-regulation. Adapted from Baumeister et al. (2005), a set of instructions was given on the computer screen as follows:

> *In your right ear you will hear a male speaker giving a lecture on physics. In your left ear you will hear a female that will say a random word every 2 seconds. Your job is to ignore the physics lecture in your right ear and only pay attention to the words the female says in your left ear. As you listen to her, hit space as quickly as possible any time you hear her say a word which contains, or begins with, the letter "m" or the letter "p". Try not to hit the spacebar if you hear words that contain these letters spoken by the physics lecturer. It is important that you pay close attention to the left ear and try your best to ignore the speech in your right ear.*

The audio recording played in the left ear consisted of a solitary female speaker clearly pronouncing random nouns derived from either a pool of distracter words which did not contain 'm' or 'p' (n=493) or a target pool (n=308) that did. All of these words were selected using the MRC Psycholinguistic Database (Wilson, 1988) based on having high (400+) familiarity, imaginability, and concreteness ratings, having only 2-3 syllables, and being no more than 7 letters long (See Appendix B.3).

This particular dichotic listening task requires one to exert control over the deployment of their attention, and for this reason it has been used to assess one's ability to

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self-regulate. To support our hypothesis that mindful individuals will be more capable than controls to regulate their behavior following the negative feedback, we predict that mindful people will be more able to detect target words than those in the control condition. Additionally, it will be interesting to see whether the salience of self-relevant thoughts impacts their performance.

2.3.8 State Affect

After the dichotic listening task, participants completed a scale that is sensitive to state variations in both positive and negative affect.

Positive Affect Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS consists of 20 affective descriptors (e.g., ''enthusiastic'', ''jittery''). For each descriptor, respondents rated on a 5-point scale the extent to which they have experienced the described affective state "right now, at the present moment" (See Appendix A.2). Mean scores can then be computed for both positive and negative affect. Positive affect has been previously associated with mindfulness (Anderson et al., 2007; Brown & Ryan, 2003; Ortner et al., 2007) and with the rejuvenation or buffering of self-regulatory energy resources (Baumeister et al., 2007; Tice et al., 2007). Thus, it will be interesting to assess the role affect plays on one's capacity for self-regulation.

2.3.9 Debriefing

Once this final scale was completed, participants underwent an extensive debriefing procedure. The experimenter apologized for the use of deceit and explained to the participant that no evaluation of their social relationships ever took place. The experimenter deliberately emphasized that no analysis of the future of their social relationships (the negative feedback) was ever conducted and that every participant

received the same feedback as a component experiment. Every participant was asked to repeat the following statement aloud: "I understand that the information disclosed to me during this experiment about the future of my social relationships was completely false. It has no basis in fact, was just a part of the experiment, and has absolutely nothing to do with me personally." All means necessary were taken to ensure that the participants expressed a clear understanding that the negative feedback was fake and untrue. Next, the experimenter explained the true nature of the study and why it was important to use deception. Before participants were dismissed the experimenter gave them a form with information about the study, and the appropriate contact information for the principle investigator, the University Counseling Center, and the University IRB (See Appendix D.2).

CHAPTER III

RESULTS

3.1 Induction Effects

To assess whether the induction had an effect we examined differences between conditions for the two primary self-report measures which assessed state mindfulness. Independent one-way analysis of variance (ANOVA) tests revealed no statistically significant differences on either the State Mindful Attention Awareness scale ($F(1,102) = .20$, $p = .66$) or the Toronto Mindfulness Scale ($F(1,102) = .003$, $p = .96$). It's possible that the effect of the induction was too subtle to be captured by these scales, so we decided to take another route.

During the state mindfulness induction, participants were asked to slowly draw a line and pay attention to the sensation of drawing it. Further, they were instructed to make a slash through this line anytime they noticed their mind wandering away from drawing it. Did the number of slashes a person draws relate to dispositional mindfulness? People in the state mindfulness induction condition who made one or more slashes ($n = 24$) scored higher on a CAMS-R measure of dispositional mindfulness (without the Acceptance items) than those in the state mindfulness induction who did not draw any slashes ($n = 28$, $M = 18.3$, $SD = 3.40$) and those in the control induction condition

($n = 52$, $M = 18.8$, $SD = 4.05$). A one-way ANOVA revealed that the effect of drawing lines was significant ($F(2, 101) = 3.82$, $p < .025$, See Figure 1). Post-hoc analyses using Tukey's criterion for significance indicated that, on average, people who made slashes during the state mindfulness induction scored significantly higher on the CAMS-R than people in the state mindfulness induction condition who did not draw lines ($p = .03$) and people in the control induction condition ($p < .05$). No significant differences were detected between no-slashes group and the control group ($p = .83$). This is intriguing evidence in support of our suggestion that drawing slashes during the induction might indicate one's ability to detect and reorient attentional focus once it has strayed.
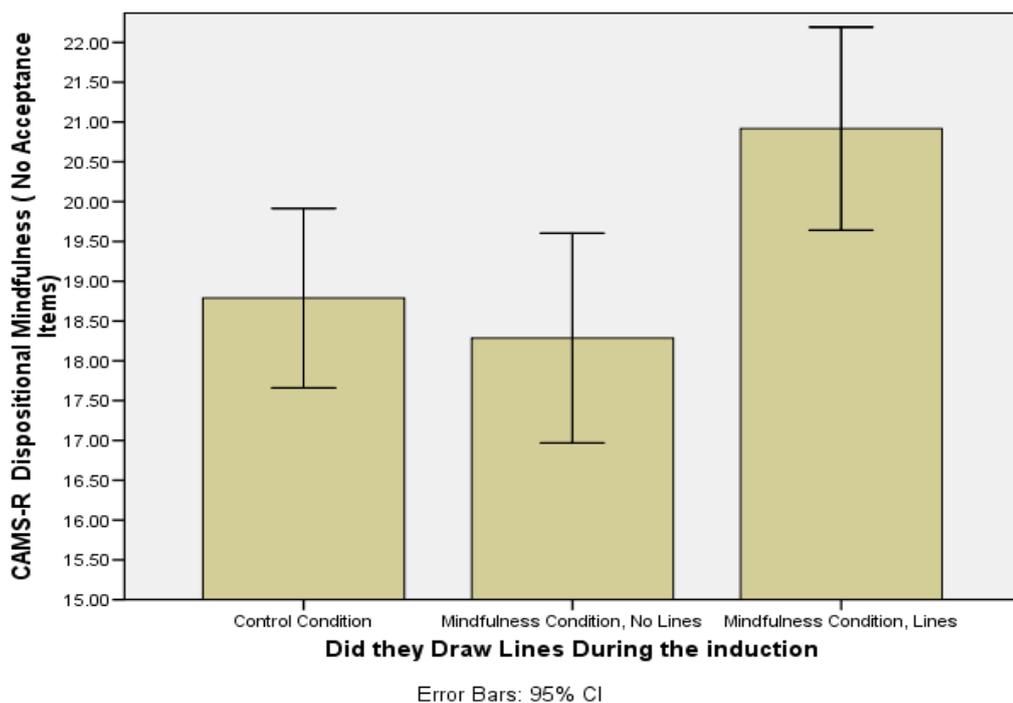

Figure 1: CAMS-R Dispositional Mindfulness X Condition

Pursuing this theory further, we decided to look at how the number of slashes a person drew might relate to the perceived impact of the induction procedures.

Immediately after the induction, all participants were asked to respond to the question

"How much did eating raisins in this way impact the way you feel right now?" on a 1-5

Likert scale (See Appendix A.2). A one-way ANOVA revealed significant variation

among the three groups ($F(2, 101) = 3.17$, p < .05, See Figure 2). On average, people

who made slashes were impacted more by the raisin eating portion of the induction

($M = 2.6$, $SD = 1.28$) than people who didn't draw slashes ($M = 2.00$, $SD = 1.02$) and the

control condition ($M = 1.92$, $SD = 1.03$). However, Tukey's criterion indicated that the

difference was only significant when comparing the control condition with people in the

state mindfulness induction who drew slashes ($p < .04$). Since the group of people who

drew lines were higher on dispositional mindfulness, it is possible that this effect is due to

variance explained by trait rather than state mindfulness. Yet, after controlling for

dispositional mindfulness (CAMS-R without acceptance items) an analyses of covariance

(ANCOVA) indicated that the effect was even stronger ($F(2,101) = 4.73$, $p < .02$). People

who drew slashes were now significantly more impacted than both those who did not

($p<= .03$) and the control condition ($p < .007$, see Chart X). In addition, after controlling

for dispositional mindfulness, a hierarchical linear regression uncovered that the number

of slashes one drew significantly predicted the perceived degree of subjective impact

from eating the raisins ($\beta = .355$, $p = .001$).

In sum, it seems that the induction was only effective for people whose level of

trait mindfulness was beyond a certain degree. The people in the mindfulness induction

condition who did not make any slashes either didn't understand the instructions, were
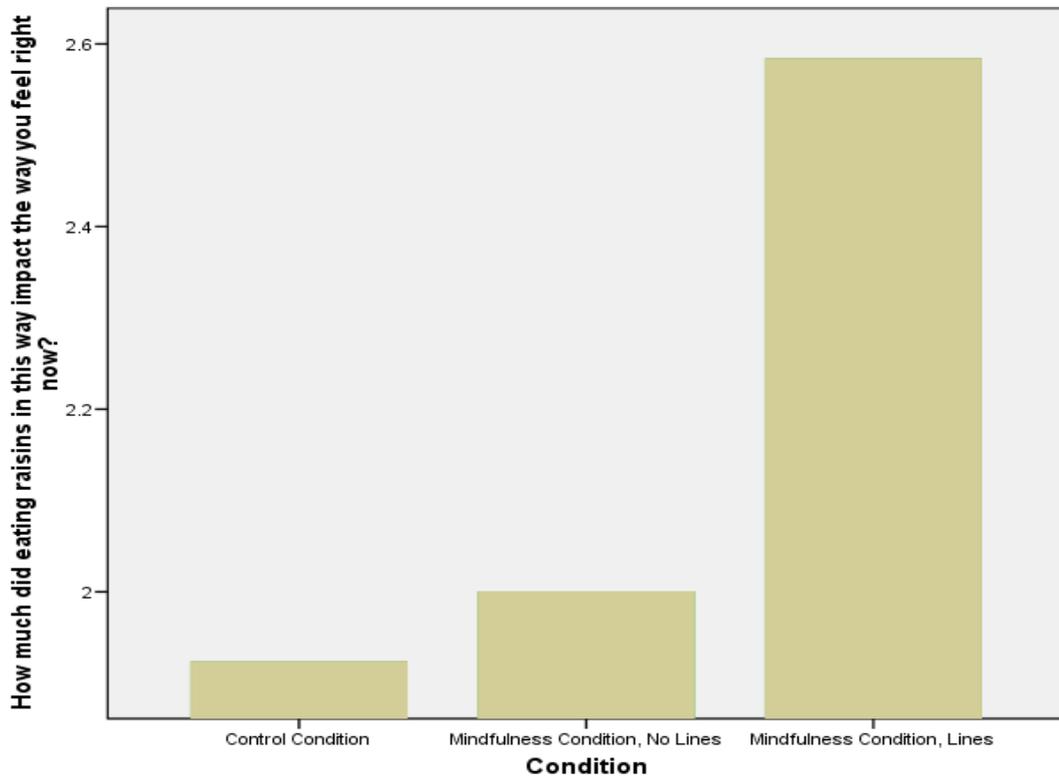
Figure 2: Induction Impact X Condition

not engaged in the activity, or they never noticed their mind wandering. In any case, this

subset of participants was unaffected by the induction and would suppress any potential

effects attributable to it. In response, we removed participants who didn't draw any

slashes from future analyses. This required us to examine any individual difference

variables upon which the control and new mindfulness induction conditions differed.

These variables will be controlled for in the remaining between condition analyses (See

Table I).

3.2 Ego Salience

All reaction time (RT) data for incorrect responses (i.e., responses which indicated that an

English word was a non-word or that a non-word was an English word) were excluded

Item	Description	Control (n = 52)	Mindfulness (n = 24)	F(1, 74)	A
CAMS-R Item 01	"It's easy for me to concentrate on what I am doing."	M = 2.79 SD = .80	M = 3.25 SD = .61	6.29	.01
CAMS-R Item 11	"I am able to focus on the present moment."	M = 2.83 SD = .83	M = 3.25 SD = .61	4.95	.03
Extraversion Item 3	"Make friends easily"	M = 3.54 SD = 1.26	M = 4.17 SD = .82	4.98	.03
Happy Rating	How much does "Happy" characterize you as a person?	M = 3.56 SD = .92	M = 4.13 SD = .54	7.91	.01
Generous Rating	How much does "Generous" characterize you as a person?	M = 3.88 SD = .83	M = 4.29 SD = .69	4.35	.04

Table I: Individual differences across Condition.

from future analyses. Additionally, any participant whose overall mean RT was three

standard deviations above or below the mean was completely removed, resulting in

the exclusion of two participants. Each person-descriptive word had been previously

matched to a corresponding neutral word and non-word based on lexical characteristics.

If an instance of data was missing for a person-descriptive, neutral, or non-word, then the

data for its corresponding matches were also removed to ensure equal comparisons across

word categories.

Each participant's RT data was sorted into groups based on the self-

descriptiveness rating assigned to them during the self-relevant word ranking task. To

control for individual response differences, each neutral word RT was subtracted from its

person-descriptive matches. Finally, a sum of these differences was computed for all

words which had been rated as "Moderately descriptive of me" or higher. Larger values

indicate slower responses to self-descriptive words in relation to their neutral matches,

and thus, lower ego-salience. This difference measure was submitted to a one-way

ANCOVA which revealed a significant effect ($F(1, 57) = 4.175$, $p < .05$) in the hypothesized direction, indicating that those in the state mindfulness condition ($n = 19$, $M = -169.06$, $SD = 202.89$) were significantly slower at responding to self-relevant words than people in the control condition ($n = 40$, $M = -291.33$, $SD = 443.34$, See Figure 3). This effect was not found for the equivalent difference measure using words that had been ranked as "Slightly descriptive of me" and below ($F(1, 55) = .035$, $p = .85$). Collectively, these findings indicate that only concepts which were specifically related to the self were less salient for mindful people, lending support to our hypothesis that self-related cognitive activity would be reduced.
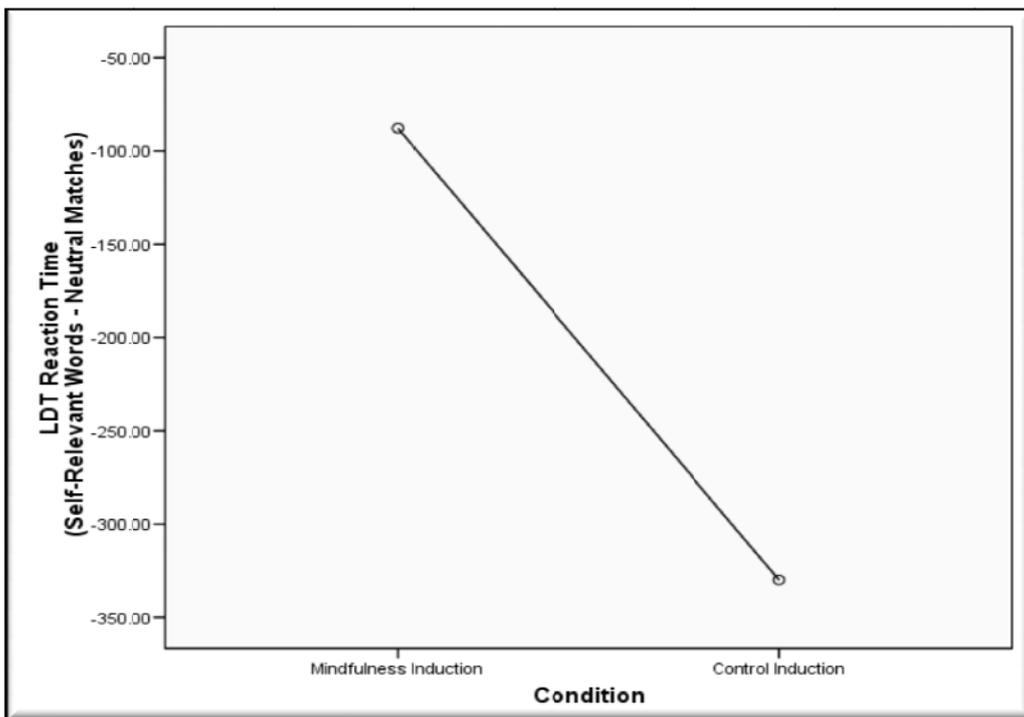
Figure 3: Ego-Salience X Condition

3.3 Self-Control

Two participants did not respond to any stimuli and were removed from the

analyses. This left 24 people in the state mindfulness induction condition and 50 people in the control condition. The hit rate and false alarm rate for each participant were used to compute d', an index of one's ability to detect a signal. Higher d' values indicate that one was more able to block out the audio playing in their right ear and deliberately focus their attention to the left ear to successfully detect targets words. Thus, larger d' values imply a stronger ability to exert self-control. A one-way ANCOVA revealed no significant differences ($F(1, 72) = .641$, $p = .426$) in performance across condition for the dichotic listening task. Could the salience of self-relevant cognitions moderate this relationship? Using hierarchical linear regression we found a significant interaction ($\beta = -.159$, $p < .02$) between condition ($\beta = -.358$, $p < .04$) and the salience of self-relevant words ($\beta = -2.146$, $p < .02$) on dichotic listening task performance (see Figure 4). When self-relevant thoughts were less active, people in the mindfulness outperformed controls. However, if self-relevant thoughts were highly active, performance was severely crippled for people in the mindfulness condition. Performance was very stable for participants in the control condition regardless of their self-relevant cognitive activity.

3.4 Affective Responses

Contrary to our initial hypothesis, state positive affect was significantly lower for people in the mindfulness condition ($n = 24$, $M = 27.63$, $SD = 8.39$) than controls ($n = 52$, $M = 29.58$, $SD = 7.88$). When submitted to a one-way ANCOVA, this group difference was significant, $F(1,74) = 4.57$, $p < .04$. A similar finding was uncovered for negative affect, indicating that people in the mindfulness condition ($M = 17.17$, $SD = 6.91$) scored higher than controls ($M = 15.56$, $SD = 6.10$), but the test was only marginally significant, $F(1,74) = 3.86$, $p = .054$. Interestingly, the complete
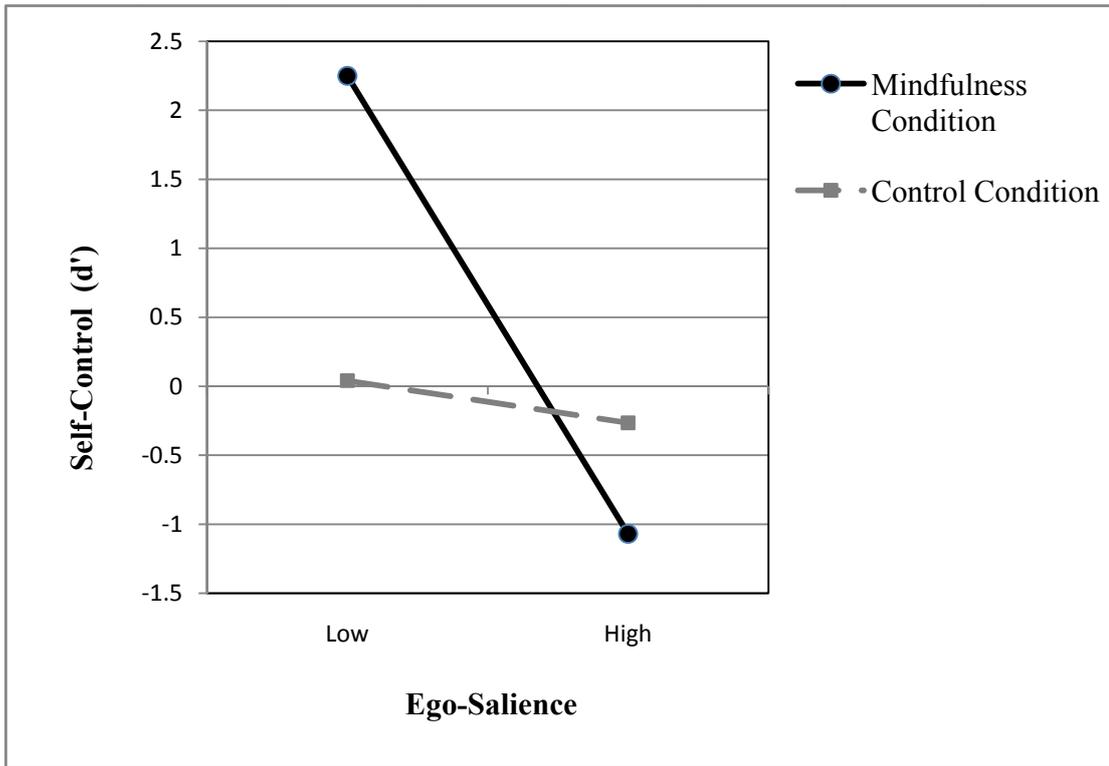
Figure 4: Ego-Salience X Condition Interaction on Self-Control

opposite pattern emerged when the relationship between dispositional mindfulness and affect was evaluated. Dispositional mindfulness related positively with positive affect ($r = .348$, $p < .002$) and negatively with negative affect ($r = -.23$, $p < .042$).

CHAPTER IV

GENERAL DISCUSSION

The use of experimental procedures to temporarily induce state mindfulness are a promising, yet under-studied, way to assess how and when variations in mindfulness cause changes in thoughts, feelings, and behavior. While the results of the present study provide support for the efficacy of our two-component mindfulness induction, strong evidence emerged suggesting ways in which the method could be improved.

Brown and Ryan (2003) contend that mindfulness is a naturally occurring quality of consciousness that can be exercised in a multitude of ways by nearly everyone. Following this line of thinking we attempted to divorce our induction procedure from the conventional meditation techniques typically associated with mindfulness, and instead used common activities that most people engage in daily—using a pen and eating. All participants were completely naïve to the nature of the induction, and words like "mindfulness" or "meditation" were never used during the experiment. Our intention was to minimize demand characteristics and the influence that preconceived notions about mindfulness or meditation might have their experience. The success of our manipulation lends empirical support to the idea that mindfulness is not chained to specific experiences

like meditation practice, but can likely be induced through variety of alternative means. In addition, these findings highlight that state inductions can measurably alter the orientation one takes towards experiences, and has little to do with how such an orientation is evoked.

While we believe that mindfulness can be exercised by almost everyone, our results suggest that the induction was only effective for people with a predetermined degree of dispositional mindfulness. The people who had a low level of dispositional mindfulness self-reported that the induction didn't affect the way they felt. Additionally, these participants didn't draw any slashes to indicate that their mind had wandered during the line-drawing portion of the induction. This finding supports our hypothesis that the number of slashes a person draws partially indicates the degree to which one is able to recognize and reorient their attention once it has wandered. While it is tempting to argue that this variable might indicate the instability of attention, our evidence suggests otherwise. The greater the number of slashes one made was positively related to dispositional mindfulness and to the degree of perceived change one felt and attributed to the induction. For those who didn't draw lines, the effect of the induction was practically identical to people who underwent the control induction, which by design was intended to cause little change. As people who cultivate a mindfulness practice can unanimously attest, it simply isn't plausible that one's mind would not wander once during a span of five minutes.

To our knowledge, only two measures exist which are sensitive to state variations in mindfulness. The Toronto Mindfulness scale, which was developed for use with clinical samples, is sensitive to changes in mindful states that develop through formal

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mindfulness meditation practice (Lau et al., 2006). Another measure, the state-sensitive variant of the MAAS (Brown & Ryan, 2003, Study 4), was developed for use as a repeated measure to assess fluctuations in state mindfulness that occur over long periods of time. Given their intended purposes, it is not surprising that these scales weren't able to detect the subtle changes caused by our mindfulness induction. However, the line drawing portion of our induction was immensely valuable in this respect. Roughly half of the participants who underwent the mindfulness induction were not affected according to this variable and when retained, they suppressed all condition effects. Future research should seek investigate the nature of this variable in more detail and, in particular, assess its utility as an indirect measure of mindfulness.

The results of the lexical decision task revealed that people induced with state mindfulness were significantly slower at responding to self-relevant words, indicating that self-related thoughts were less active. No such difference was found for words that were not self-descriptive. This lends strong support to our hypothesis that mindfulness would be associated with the inhibition of self-relevant cognitive activity, and bolsters a present theory which associates mindfulness with less ego-involvement (Brown et al., 2007a; 2007b; Heppner et al., 2008). Higher levels of ego-involvement are associated with fragile, unstable forms of high self-esteem (Kernis, 2003) in which one consistently deploys esteeming processes, and is strongly dependent upon them as a means to validate self-worth (Ryan & Brown, 2003). For such people attention will naturally be biased to favor self-related thoughts because they are more accessible (Leary, 2004). In other words, this "quieting of the ego" represents an orientation towards the data of immediate experience where one's perspective of the present is less skewed by personal beliefs, or

interests to enhance, protect, or serve the self. In this sense, the claim that mindfulness fosters a more empirical perspective or "unbiased receptivity" towards the contents of consciousness is consistent with the results of this study (Brown et al., 2007a, p. 213). Moreover, if self-relevant cognitions are less salient and awareness is controlled less by self-driven motives during a mindful state, then the self-reflexive quality of consciousness is being relied upon less to set and guide processing objectives.

The present study also provides support linking a mindful state with the pre-reflexive quality of consciousness. This implies that a shift occurs in the way the monitoring and control processes of consciousness are deployed during self-regulation. As abstract self-related patterns of thought become less salient, their tendency to interfere with one's ability to monitor information from the present should be reduced (Bishop et al., 2004; Brown et al., 2007a; Heppner & Kernis, 2007; Leary et al., 2006). While the dichotic listening task did measure one's ability to exert self-control, the monitoring and control functions of consciousness operate in tandem, so effective performance clearly relied on monitoring processes as well. Our results indicated that people in the mindfulness condition outperformed controls *only* when the salience of self-relevant cognitions was low. Following our theory, these improvements were likely due to a reduction of interference caused by self-relevant cognitions. The performance benefits witnessed are particularly intriguing because they were contingent upon the salience level of self-relevant cognition.

Another interesting topic centers around the degree of subjective impact the negative feedback had on our participants. Our results replicated the findings of several previous studies linking dispositional mindfulness with higher positive affect and lower

negative affect (Baer, 2004; Brown & Ryan, 2003; Feldman et al., 2007). We thought that the same finding would hold for people induced with state mindfulness. Shouldn't mindful people be impacted less by the self-threatening negative feedback because self-related information is less influential when mindful? Our results indicated that this was not the case. People in the mindfulness condition had significantly lower positive affect and higher negative affect than controls. While this ran contrary to our initial thinking, a closer evaluation of the self-regulation literature enabled us to better understand and theorize reasons why.

Using an identical negative feedback and dichotic listening task procedure Baumeister et al. (2005) found that one's ability to self-regulate was hindered because such awful information made self-awareness aversive and something to avoid. Self-awareness is required to monitor changes in the self and control behavior toward goal states. They tested this in a follow-up experiment and found that self-regulation was not hindered when participants were placed in front of a mirror (to induce self-awareness). In other words, people attempt to numb themselves to the threatening information by lowering self-awareness. Because one must exert self-control to behave in ways that contradict personal desires, and given that negative affect is itself a signal that indicates one should exert more self-control, our results suggest that people in the mindfulness condition didn't use maladaptive strategies such as suppression, to numb themselves or forgo dealing with a negative situation. Instead, it seems that their justifiable change in affective state induced the exertion of self-control such that the aversive information could be confronted directly. Such an approach indicates a certain degree of inner strength. Mindful people didn't *react* to the negative feedback or try to avoid it, but

stayed with an undesirable situation, faced it squarely, and dealt with it adaptively. In support of this interpretation, similar results from an unpublished study by Niemiec, Brown & Ryan (2006) found that mindful people in a mortality salience condition were more willing to process death-related experiences for a longer period of time, and they suppressed thoughts about death less. Such results have powerful therapeutic implications for populations who are regularly placed in socially threatening situations, such as police officers, prison guards, and prisoners.

4.1 Limitations and Future Directions

As research utilizing lab-induced state mindfulness manipulations continues to grow, it will become increasingly important to develop a means to quantify the impact of various induction techniques such that they can be improved upon and standardized. The present-study provided a starting point for such a manipulation check—the number of times a person caught their mind wandering during the induction. The efficacy of this variable should be submitted to a more rigorous investigation. For example, data could be collected to assess the duration between instances of the mind wandering, and used to expand upon and interpret the meaning of this variable in more detail.

A severe limitation of the present study was the efficacy of the induction for people with low levels of dispositional mindfulness. Future studies should seek to assess the relationship between dispositional mindfulness and induction efficacy under controlled conditions using a selective, rather than random sampling method. It would also be valuable to examine the distinct ways that dispositional and state mindfulness have to impact ego-salience.

4.2 Conclusions

In conclusion, results from the lexical decision and dichotic listening tasks converge and reveal a linear trend: mindfulness reduces the salience of self-relevant thoughts and this effect subsequently improves the ability to self-regulate behavior. In line with past research (Brown et al., 2008; Heppner et al., 2008; Niemiec et al., 2006), we uncovered evidence that mindfulness is associated with adaptive responses to threatening information. This evidence provides strong support for the notion that many of the salutatory outcomes associated with mindfulness could be due, at least in part, to a tempering of the influence that self-related information has over thoughts, feelings, and behavior.

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APPENDICES

APPENDIX A

(Self-Report Measures)

Scale items completed by participants. Sources are included in questionnaire headers.

A.1 Individual Difference Measures

IPIP Extraversion Scale
(Goldberg, Johnson, Eber, Hogan, Ashton et al., 2006)

Instructions: On the following screen, there are phrases describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Please read each statement carefully, select the most appropriate option.

1	2	3	4	5
Very Inaccurate	Moderately Inaccurate	Neither Inaccurate nor Accurate	Moderately Accurate	Very Accurate

1. Feel comfortable around people.
2. Have little to say.
3. Make friends easily.
4. Keep in the background.
5. Am skilled in handling social situations.
6. Would describe my experiences as somewhat dull.
7. Am the life of the party.
8. Don't like to draw attention to myself.
9. Know how to captivate people.
10. Don't talk a lot.

<u>Scoring Instructions</u>
Extraversion: All even items are reverse scored (2R,4R,6R,8R,10R)
Total: Compute the mean of all 10 items after reverse scoring.

Mindful Attention Awareness Scale
(MAAS; Brown & Ryan, 2003)

<u>Day-to-Day Experiences</u>

<u>Instructions:</u> Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6
Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never

1. I could be experiencing some emotion and not be conscious of it until some time later.
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.
3. I find it difficult to stay focused on what's happening in the present.
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.
5. I tend to not notice feelings of physical tension or discomfort until they really grab my attention.
6. I forget a person's name almost as soon as I've been told it for the first time.
7. It seems I am "running on automatic" without much awareness of what I'm doing.
8. I rush through activities without being really attentive to them.
9. I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.
10. I do jobs or tasks automatically, without being aware of what I'm doing.
11. I find myself listening to someone with one ear, doing something else at the same time.
12. I drive places on "automatic pilot" and then wonder why I went there.
13. I find myself preoccupied with the future or the past.
14. I find myself doing things without paying attention.
15. I snack without being aware that I'm eating.

<u>Scoring Instructions</u>
To score the scale, simply compute a mean of the 15 items. Higher scores reflect higher levels of dispositional mindfulness.

Cognitive and Affective Mindfulness Scale Revised
(CAMS-R; Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J., 2007)

Instructions: People have a variety of ways of relating to their thoughts and feelings. For each of the items below, rate how much each of these ways applies to *you*, using the following scale.

1	2	3	4
Rarely / Not at all	Sometimes	Often	Almost Always

1. It is easy for me to concentrate on what I am doing.
2. I am preoccupied by the future.
3. I can tolerate emotional pain.
4. I can accept things I cannot change.
5. I can usually describe how I feel at the moment in considerable detail.
6. I am easily distracted.
7. I am preoccupied by the past.
8. It's easy for me to keep track of my thoughts and feelings.
9. I try to notice my thoughts without judging them.
10. I am able to accept the thoughts and feelings I have.
11. I am able to focus on the present moment.
12. I am able to pay close attention to one thing for a long period of time.

Scoring Instructions:
Items 2, 6, & 7 are reverse scored. After appropriate reversals, sum all the responses. Higher values reflect greater mindfulness.

Self-Relevant Word Rating Task
(Developed by the authors)

Instructions: On the following screen, there are words that people often use to describe themselves. Please use the rating scale below to describe how accurately each statement describes you as a person.

1 Not descriptive of me at all	2 Somewhat descriptive of me	3 Moderately descriptive of me	4 Very descriptive of me	5 Extremely descriptive of me

1. Bright
2. Smart
3. Quiet
4. Clumsy
5. Intense
6. Vulgar
7. Happy
8. Weak
9. Polite
10. Practical
11. Clever
12. Generous
13. Just
14. Kind
15. Gentle
16. Genuine
17. Brave
18. Orderly
19. Inadequate
20. Wise

A.2 State Measures

State Mindful Attention Awareness Scale
(Brown & Ryan, 2003, study 4)

<u>Instructions:</u> To what degree were you just having these experiences? Please indicate your response using the scale below.

0	1	2	3	4	5	6
Not at all			Somewhat			Very Much

1. I found it difficult to stay focused on what was happening in the present.
2. I rushed through the activity without being really attentive to it.
3. I performed the task automatically, without being aware of what I was doing.
4. I found myself preoccupied with the future or the past.
5. I found myself doing things without paying attention.

<u>Scoring Instructions</u>
Reverse score and sum items.

Toronto Mindfulness Scale
(TMS; Lau et al., 2006)

Instructions: We are interested in what you just experienced. Below is a list of things that people sometimes experience. Please read each statement. Next to each statement are five choices: "not at all," "a little," "moderately," "quite a bit," and "very much." Please indicate the extent to which you agree
with each statement. In other words, how well does the statement describe what you just experienced, just now?

0	1	2	3	4
Not at all	A little	Moderately	Quite a bit	Very Much

1. I experienced myself as separate from my changing thoughts and feelings.
2. I was more concerned with being open to my experiences than controlling or changing them.
3. I was curious about what I might learn about myself by taking notice of how I react to certain thoughts, feelings, or sensations.
4. I experienced my thoughts more as events in my mind than as a necessarily accurate reflection of the way things 'really' are.
5. I was curious to see what my mind was up to from moment to moment.
6. I was curious about each of the thoughts and feelings that I was having.
7. I was receptive to observing unpleasant thoughts and feelings without interfering with them.
8. I was more invested in just watching my experiences as they arose, than in figuring out what they could mean.
9. I approached each experience by trying to accept it, no matter whether it was pleasant or unpleasant.
10. I remained curious about the nature of each experience as it arose.
11. I was aware of my thoughts and feelings without overidentifying with them.
12. I was curious about my reactions to things.
13. I was curious about what I might learn about myself by just taking notice of what my attention gets drawn to.

Scoring Instructions
Curiosity: 3, 5, 6, 10, 12, 13
Decentering: 1, 2, 4, 7, 8, 9, 11

(No reverse scoring, just sum the items)

State Positive Affect Negative Affect Scale
(PANAS; Watson, Clark, & Tellegen, 1988)

Instructions: This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate answer next to that word. Indicate to what extent you feel this way <u>right now, that is, at the present moment</u>. Use the following scale to record your answers.

1 Very slightly or not at all	2 A little	3 Moderately	4 Quite a bit	5 Extremely

1. Interested
2. Distressed
3. Excited
4. Upset
5. Strong
6. Guilty
7. Scared
8. Hostile
9. Enthusiastic
10. Proud
11. Irritable
12. Alert
13. Ashamed
14. Inspired
15. Nervous
16. Determined
17. Attentive
18. Jittery
19. Active
20. Afraid

Scoring Instructions
Positive Affect: 1, 3, 5, 9, 10, 12, 14, 16, 17, 19
Negative Affect: 2, 4, 6, 7, 8, 11, 13, 15, 18, 20

We have used PANAS with the following time instructions:
Moment: (you feel this way right now, that is, at the present moment)
Today: (you have felt this way today)
Past few days: (you have felt this way during the past few days)
Week: (you have felt this way during the past week)
Past few weeks: (you have felt this way during the past few weeks)
Year: (you have felt this way during the past year)
General: (you generally feel this way, that is, how you feel on the average)

Custom Items
(Developed by the authors)

Using the scale shown below, please answer the following questions about what you just experienced.

0	1	2	3	4
Not at all	A little	Moderately	Quite a bit	Very Much

1. How much do you usually enjoy eating raisins?
2. How much did you enjoy eating raisins the way you did today?
3. How effortful was it for you to eat raisins in this way?
4. How much did eating raisins in this way impact the way you feel right now?

APPENDIX B
(Stimuli)

B.1 Negative Feedback

This window appeared before printing the negative feedback report.


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    "Licensed Materials").  Licensee and its Authorized Users acknowledge
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    Licensee non-exclusive use of the Licensed Materials and the right to
    provide the Licensed Materials to Authorized Users in accordance with
    this Agreement.


  Connecting to TDR Analysis Server...

  Connected...
  SSH Enabled...

  Running Batch Analysis Daemon...

  Analysis: Regression Forecast on [Sociability] using [Weighted
  Standardized Constructs].

  Primary Factor: [Extraversion]
  Secondary Factor: [None]
  Weighted Factors: [Abstractedness];
                    [Emotional Stability];
                    [Apprehension];
                    [Self-Reliance];
                    [Perfectionism];
                    [Sensitivity];
                    [Dominance]... Done.

  Analysis Completed...

  Exiting Batch Analysis Daemon...


  Running Report Daemon...

  Legacy Drivers Detected...

  Sending [Overview Report] to LPT1 on 192.168.0.234
  Exiting...
```

Negative Feedback Report

Session Report (Overview)

| Experiment ID: PAR-434 |
| Exp. Login: 2328984 |

Participant ID: 1-138	
Gender:	Male
Age:	41
Rel. Status	In a Relationship
People in Home:	1

| Date: | 4/15/2009 |
| Time: | 6:43 PM |

Trait Index	Score	Percent Below
Extraversion*	39	82
Abstractedness	32	83
Emotional Stability	27	64
Apprehension	17	88
Self-Reliance	73	44
Perfectionism	22	65
Sensitivity	38	32
Dominance	34	79
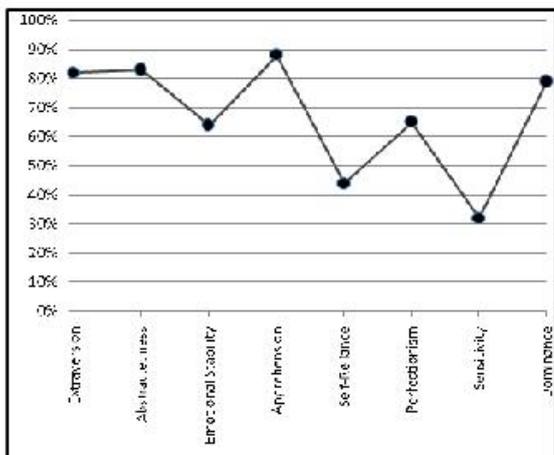
*Primary factor selected for regression forecasting.

Sociability Regression Forecast [Extraversion]: Type 32

You're the type who will end up alone later in life. You may have friends and relationships now, but into your 50's most of these will have drifted away. You may even marry, or have several marriages, but these are likely to be short lived. Relationships don't last, and since you're past the age where people are constantly forming new relationships, the odds are that you'll end up being alone more and more.**

** To access more detailed information regarding this Regression Forecast, please login.

TDR Psychometrics, Inc

B.2 Lexical Decision Task

Stimuli randomly presented during lexical decision task

PERSON-DESCRIPTIVE	NEUTRAL MATCHES	NON-WORDS MATCHES
BRIGHT	SIGNAL	PHOWLS
SMART	SPARE	YOARS
QUIET	BROAD	VOUZZ
CLUMSY	STALE	RHORDE
INTENSE	MINUTE	SKROODE
VULGAR	TOPIC	SPAITE
HAPPY	BRIEF	DOURM
WEAK	WEST	HADD
POLITE	UPRIGHT	NAIMED
PRACTICAL	UNIVERSAL	PLEIGHGUE
CLEVER	OBSCURE	MURQUE
GENEROUS	INFINITE	GROWGNED
JUST	EVERY	KNIF
KIND	MAIN	NOKT
GENTLE	FARTHER	BOARKS
GENUINE	SEVERE	WHAWPED
BRAVE	WORSE	JORZE
ORDERLY	FIFTEEN	FOURLTE
INADEQUATE	THEORETICAL	SCKWEACKED
WISE	EXTRA	YIER

Differences between person-descriptive and neutral words on various lexical properties

Word Property	t	α (two-tailed)
Number of letters	-.186	.853
Log of frequency	.024	.981
Familiarity rating	.715	.479
Concreteness rating	-.106	.916
Mean RT in other LDTs	1.15	.255

B.3 Dichotic Listening Task

Distracter Stimuli

ABANDON	BASIN	CASUALTY	CONCRETE
ACCIDENT	BATTLE	CATTLE	CONDITION
ACCOUNT	BEAUTY	CEILING	CONFIDENCE
ADDITION	BEETLE	CENTER	CONFUSION
ADJECTIVE	BEGINNING	CENTURY	CONSCIENCE
ADULT	BEHAVIOUR	CEREAL	CONSEQUENCE
ADVANTAGE	BELIEF	CHALLENGE	CONSTANT
ADVICE	BETTER	CHARACTER	CONTACT
AFFAIR	BEVERAGE	CHARITY	CONTENT
AFFECTION	BISCUIT	CHERRY	CONTENTS
AFTERNOON	BLANKET	CHESTNUT	CONTRACT
AGONY	BOATING	CHICKEN	CONTROL
ALCOHOL	BODY	CHILDHOOD	CORNER
ALERT	BONUS	CHILDREN	CORRIDOR
ALLEY	BOTHER	CHILLY	COTTAGE
ANGER	BOTTLE	CHINA	COTTON
ANGLE	BRACELET	CHOCOLATE	COUNCIL
ANKLE	BRANDY	CHOIR	COUNTRY
ANSWER	BREAKFAST	CHUCKLE	COURAGE
AREA	BROTHER	CIDER	COUSIN
ARRIVAL	BUBBLE	CIGAR	COVER
ARTICLE	BUCKET	CIGARETTE	COWBOY
ARTIST	BUDGET	CIRCLE	CREATURE
ASSISTANCE	BUILDER	CITIZEN	CRISIS
ATTITUDE	BULLET	CITY	CRYSTAL
AUDIENCE	BURNER	CLOSER	CULTURE
AUTHOR	BUSINESS	CLOSET	CURLER
AVENUE	BUTTER	CLOTHING	CURRENT
AVERAGE	BUTTON	COCKTAIL	DAISY
BABY	CABBAGE	COFFEE	DANCER
BACKGROUND	CABIN	COFFIN	DANGER
BALANCE	CAFÉ	COLLAR	DAYLIGHT
BALLOON	CANCER	COLLECTION	DECAY
BANANA	CANDLE	COLLEGE	DECISION
BANDAGE	CANDY	CONCERN	DEFEAT
BANKER	CAREER	CONCERT	DEGREE
BARGAIN	CARROT	CONCLUSION	DELIGHT

DENTIST	EVENT	GRAVEL	INSECT
DESIGN	EVIDENCE	GRAVY	INSIDE
DESIRE	EVIL	GROCER	INSTANCE
DETECTIVE	EXCHANGE	GUITAR	INSTINCT
DEVICE	EXCUSE	HANKERCHEIF	INSTITUTE
DIAL	EXHAUST	HARBOUR	INSTRUCTION
DIET	EXHAUSTION	HATRED	INSTRUCTOR
DIFFERENCE	EXIT	HAZARD	INSULT
DINNER	EXTENT	HEAVEN	INTELLECT
DIRECTION	EXTRA	HERO	INTENTION
DISASTER	FACTORY	HEROIN	INTEREST
DISCUSSION	FAILURE	HISTORY	INTERVIEW
DISEASE	FANCY	HOBBY	IRON
DISTANCE	FASHION	HOCKEY	ISLAND
DISTRACTION	FATHER	HOLIDAY	ISSUE
DIVISION	FAVOURITE	HOLLOW	IVORY
DOCTOR	FEELING	HONESTY	JACKET
DOLLAR	FIFTEEN	HONEY	JEALOUSY
DOORWAY	FIGURE	HONOUR	JELLY
DOZEN	FINANCE	HORROR	JERSEY
DRESSER	FINISH	HOTEL	JEWEL
DRIVER	FIRE	HOUR	JUSTICE
DRIZZLE	FLAVOUR	HOUSEHOLD	KETTLE
DUTY	FLOWER	HUNGER	KITTEN
EFFECT	FOOTBALL	HUSBAND	KNOWLEDGE
EFFORT	FORECAST	IDEA	LABOUR
ELBOW	FOREHEAD	IDEAL	LADDER
ELECTION	FOREST	IGNORANCE	LADY
ENGINE	FORWARD	INCENSE	LAUGHTER
ENGINEER	FUNCTION	INCREASE	LAUNDRY
ENTRANCE	FURNITURE	INDIAN	LAWYER
ENVY	FUTURE	INDUSTRY	LEADER
EQUAL	GALLON	INFANT	LEATHER
ERROR	GARLIC	INFERIOR	LECTURE
ESSAY	GENERAL	INFLUENCE	LECTURER
EVEN	GORILLA	INJURY	LESSON
EVENING	GRADUATE	INNOCENCE	LETTER

LETTUCE	ORDER	RELIGION	SIGNAL
LEVEL	ORDERLY	RESCUE	SILENCE
LEVER	ORDINARY	RESEARCH	SILVER
LIAR	ORGAN	RESISTANCE	SINGER
LIAR	ORIGIN	RESORT	SISTER
LIBRARY	OTHER	RESULT	SLAVERY
LIGHTER	OUTGOING	REWARD	SOCCER
LINEN	OUTSIDE	RIDICULE	SODA
LION	OVEN	RIVER	SOFA
LIQUID	OWNER	ROBBERY	SOLDIER
LIQUOR	OXYGEN	ROCKET	SOLUTION
LOCKER	QUALITY	ROUTINE	SQUIRREL
LUXURY	QUANTITY	RUBBER	STABLE
NARROW	QUARTER	RULER	STANDARD
NATION	QUESTION	RUNNER	STATION
NATIVE	QUIET	SAFETY	STOCKING
NATURE	RABBI	SALAD	STORY
NECKLACE	RABBIT	SALARY	STRANGER
NEEDLE	RADICAL	SAUCER	STRAWBERRY
NEGLECT	RADIO	SCISSORS	STUDENT
NEIGHBOUR	RAZOR	SEASON	SUBJECT
NEIGHBORHOOD	REACTION	SECOND	SUBSTANCE
NICKEL	READING	SECRETARY	SUBSTITUTE
NIGHTGOWN	REAL	SELECTION	SUBTRACTION
NONSENSE	REASON	SENSATION	SUCCESS
NOTICE	RECALL	SENSITIVE	SUGAR
NOVEL	RECEIVER	SERIES	SUGGESTION
OBEDIENCE	RECORD	SERVICE	SUNBURN
OBJECT	REDUCTION	SESSION	SUNLIGHT
OCCASION	REFEREE	SHADOW	SUNSET
OCEAN	REFLECTION	SHALLOW	SUNSHINE
OFFICE	REFLEX	SHELTER	SURFACE
OFFICER	REFRAIN	SHIVER	TABLE
ONION	REFUSE	SHORTAGE	TALENT
ORAL	REGRET	SHOULDER	TEACHER
ORANGE	RELATION	SHOVEL	TENDENCY
ORCHESTRA	RELIEF	SHOWER	TENDER

TENNIS
THEORY
THUNDER
TICKET
TIGER
TIRE
TITLE
TOASTER
TOBACCO
TOILET
TOURIST
TRACTOR
TRADITION
TRAGEDY
TRAILER
TRANSFER
TRAVEL
TREASURER
TRIAL
TRIANGLE
TROUBLE
TUNNEL
TURTLE
UNCLE
UNDER
UNIT
VALLEY
VALUABLE
VALUE
VEHICLE
VELVET
VILLAGE
VISITOR
VODKA
VOTER
WALLET
WALNUT

WALRUS
WATER
WEATHER
WELFARE
WHISKEY
WHISTLE
WINDOW
WINTER
WIRE
WORKER
WRITING
ZERO

Target Stimuli

AGREEMENT	DEPARTMENT	MACHINE	MORAL
AMATEUR	DIAMOND	MAGAZINE	MORNING
AMBITION	DRAMA	MAGICIAN	MORTGAGE
AMMONIA	DREAMER	MAGNET	MOSQUITO
AMOUNT	EARTHWORM	MAJOR	MOTHER
ANIMAL	EMOTION	MANAGEMENT	MOTION
ANNOUNCEMENT	EMPLOYMENT	MANKIND	MOTIVE
APPOINTMENT	EMPTY	MANNER	MOTOR
ARMY	ENEMY	MANY	MOUNTAIN
ARRANGEMENT	ENGAGEMENT	MAPLE	MOVIE
ASSUMPTION	EQUIPMENT	MARKET	MURDER
ATMOSPHERE	ESTIMATE	MARRIAGE	MUSCLE
ATOM	EXCITEMENT	MATERIAL	MUSIC
ATTEMPT	EXTREME	MATTER	MUSICAL
AUTUMN	FAMILY	MATTRESS	MUSICIAN
BASEMENT	FIREMAN	MEASURE	MUSTARD
BEDROOM	FORMER	MEDICINE	MYSTERY
BLOSSOM	FREEDOM	MEETING	NUMBER
BOREDOM	GENTLEMAN	MEMBER	REMARK
BOTTOM	GOVERNMENT	MEMORY	REMINDER
CAMERA	GRAMMAR	MENU	REPLACEMENT
CEMENT	GRANDMOTHER	MESSAGE	ROMANCE
CHAMPION	HAMMER	METAL	RUMOUR
CHEMISTRY	HARMONY	METHOD	SEMESTER
CHIPMUNK	HELMET	MIDNIGHT	SPECIMEN
CHRISTMAS	HONEYMOON	MILEAGE	STADIUM
CINNAMON	HUMOUR	MILLION	STATEMENT
CIRCUMSTANCE	IMPATIENCE	MINER	STOMACH
COLUMN	IMPORT	MINISTER	STUMBLE
COMEDY	IMPORTANCE	MINOR	SUMMER
COMFORT	IMPRESSION	MINUTE	SYMBOL
COMMAND	IMPROVEMENT	MIRROR	SYMPATHY
COMMITTEE	INCOME	MISSILE	SYSTEM
COMMON	INSTRUMENT	MISTAKE	TEMPER
COMPACT	INTIMATE	MISTER	TEMPERATURE
COMPANY	ITEM	MIXER	TOMATO
COMPLIMENT	JUDGEMENT	MIXTURE	TREATMENT
CUCUMBER	KINGDOM	MODERN	UMBRELLA
CUSTOM	LEMON	MOMENT	UMPIRE
CUSTOMER	LEMONADE	MONEY	VICTIM
DAMAGE	LIMOUSINE	MONKEY	VOLUME

WELCOME	PARAGRAPH	PORTION	RESPECT
WISDOM	PARCEL	POSITION	RESPONSE
WOMAN	PARDON	POSSESSION	SPARROW
APPEAL	PARLIAMENT	POSTER	SPEAKER
APPEARANCE	PARTNER	POTATO	SPECIAL
APPLE	PARTY	POVERTY	SPIDER
APPROVAL	PASSAGE	POWDER	SPIRIT
APRON	PASSENGER	PRAYER	SUPERIOR
APTITUDE	PASSION	PREFERENCE	SUPPER
ASPIRIN	PASSIVE	PREJUDICE	SUPPLY
CAPITAL	PATIENCE	PRESENCE	SUPPORT
CAPSULE	PATIENT	PRESENT	SURPRISE
CARPET	PATTERN	PRESIDENT	TABLESPOON
CONCEPT	PAYMENT	PRESSURE	TELEPHONE
DEPOSIT	PEDAL	PRINCESS	TOPIC
DEPRESSION	PENCIL	PRIVATE	TULIP
DESCRIPTION	PENNY	PROBLEM	TYPEWRITER
DISCIPLINE	PEOPLE	PRODUCE	UPSET
DISPLAY	PEPPER	PRODUCT	WEAPON
DISPUTE	PERCEPTION	PRODUCTION	WHISPER
ENVELOPE	PERFECT	PROFESSION	ZIPPER
ESCAPE	PERFORMANCE	PROFESSOR	
EXCEPTION	PERIOD	PROFIT	
EXPANSION	PERMISSION	PROGRAMME	
EXPERIENCE	PERMIT	PROMISE	
EXPOSURE	PERSON	PROMOTION	
EXPRESS	PHOTOGRAPH	PROPERTY	
EXPRESSION	PIANO	PROPHET	
FIREPLACE	PICKLE	PROPORTION	
FOOTSTEP	PICTURE	PROTECTION	
FRIENDSHIP	PILLOW	PROTEST	
GRASSHOPPER	PIMPLE	PUBLIC	
HOSPITAL	PITY	PUDDING	
LANDSCAPE	PLEASURE	PUDDLE	
NEWSPAPER	POCKET	PUNISHMENT	
OPENING	POET	PUPIL	
OPINION	POETRY	PUPPY	
PAINTER	POISON	PURPOSE	
PANIC	POLICEMAN	RASPBERRY	
PAPER	POLLUTION	REPAIR	
PARADE	PONY	REPORT	

APPENDIX C

(Scripts)

C.1 Cover Story

There has been a long-standing interest in psychology to be able to predict how people behave. And in social psychology, which is what we are interested in, we try to make predictions about how people interact with others in social situations. What we are trying to do today is to extend some of this research and figure out what personality factors might help or hinder our ability to make these kinds of predictions. So, let me go over what you will be doing today. First you will answer some survey questions on the computer that assess some of your personality traits. Next, you will be relocated to a different area where you will follow instructions over given over a pair of headphones. After that you will go back to the original computer, complete a few quick survey questions and complete a short word game. Then you will get a short break. We have found in previous studies which take an hour that the data we collect goes downhill about 2/3 the way through. So… we give you the opportunity to relax and catch your breath. However, we also attempt to answer some of the over-arching questions we get regarding our research. Everyone seems to ask 'what are my personality traits like?' or 'what predictions would you make about me.' So, we will use this break to provide you with some feedback. We will print a 'Session Overview' report that contains an assessment of the data that we have collected up to this point. I will briefly go over how to interpret the report and will leave it with you to review for the next few minutes or so. Then, after that there is another activity using the headphones, a few more survey questions, and then you will be good to go.

C.2 Mindfulness Induction

The following instructions were administered over headphones to all participants in the mindfulness induction condition.

- Please take a few moments to settle in, relax, and get comfortable.
- We often ignore the simple details in our lives. It is as if we are running on automatic, and just forget to notice. Right now, I would like you to pay attention to all these little details.
- Look at the environment you are in right now, take notice of your surroundings, and become familiar with their details.
- Bring your attention to the pen and sheet of paper in front of you.
- Slowly, pick up the pen on the table in front of you and pay close attention to my instructions.
- In a moment, I would like you to start drawing a horizontal line on the sheet of paper in front of you. Please draw as slowly as you possibly can. While you draw the line, focus on how the pen feels in your hand, and the sensation of slowly, steadily pushing the pen along. Do your best to stay focused on the immediate experience of drawing the line. If you lose focus, or begin to daydream, even the slightest amount, stop, make a quick slash mark through the line you are drawing, begin again exactly where you left off, and redirect your attention back to the immediate experience of drawing the line.
- Please begin drawing the line now.
- Please draw as slowly as you possibly can.
- Focus on how the pen feels in your hand and the sensation of slowly, steadily, pushing the pen along
- If you lose focus, or begin to daydream, even the slightest amount, stop, make a quick slash mark through the line you are drawing, begin again exactly where you left off, and redirect your attention back to the immediate experience of drawing the line.
- Please stop drawing and place your pen back on the table
- Please stop drawing and place your pen back on the table
- Now that you have finished this exercise, I'd like to guide you through another task.
- Please continue to focus your attention on the little details as you have already been doing.
- Bring your attention to the box of raisins on the table in front of you.
- What I would like to do today is help you to look at raisins in an entirely new way.
- As if it were the first time you had ever seen them or tasted them before.
- Look at the box of raisins on the table in front of you.
- Take note of whether simply acknowledging the box causes you to feel a certain way.
- Do any memories come to mind?

- Now, please slowly guide your arm, paying attention to how the movement feels, and carefully pick up the small, red box of raisins.
- Notice the smoothness of the box in your hand, and the distinct sensation you feel on your fingertips touching its edges.
- Carefully open the box, and take out a raisin.
- Mentally walk through how you will move to return the box of raisins back to its original position on the table.
- Now, return the box to the table, placing it back in the exact location where you found it.
- Remember to pay attention to any sensations that arise while moving your arm.
- Bring your attention to seeing the raisin you are holding.
- Observe it carefully, with a sense of curiosity, as if you have never seen one before.
- Try to notice the texture of the raisin between your fingers.
- Notice its colors and surfaces.
- Take note of the thoughts you might be having about raisins, or food in general.
- Now, take time to smell the raisin.
- Notice that you may be salivating in anticipation of eating it.
- Now, chew it slowly and experience the actual taste of one raisin.
- Pay attention to how its texture changes over time as you chew it.
- Notice that your impulse to swallow is almost automatic.
- Notice any remaining flavors once the raisin is gone.
- Pay attention to the last remnants of the after taste as it slowly fades away.
- I'd like to guide you through this process one more time.
- Bring your attention to the box of raisins on the table in front of you.
- Take note of whether simply acknowledging the box causes you to feel a certain way.
- Do any memories come to mind?
- Now, please slowly guide your arm, paying attention to how the movement feels, and carefully pick up the small, red box of raisins.
- Notice the smoothness of the box in your hand, and the distinct sensation you feel on your fingertips touching its edges.
- Carefully open the box, and take out a raisin.
- Mentally walk through how you will move to return the box of raisins back to its original position on the table.
- Now, return the box to the table, placing it back in the exact location where you found it.
- Remember to pay attention to any sensations that arise while moving your arm.
- Bring your attention to seeing the raisin you are holding. Observe it carefully, with a sense of curiosity, as if you have never seen one before.
- Try to notice the texture of the raisin between your fingers.
- Notice its colors and surfaces.
- Take note of the thoughts you might be having about raisins, or food in general.
- Now, take time to smell the raisin.

- Notice that you may be salivating in anticipation of eating it.
- Now, chew it slowly and experience the actual taste of one raisin.
- Pay attention to how its texture changes over time as you chew it.
- Notice that your impulse to swallow is almost automatic.
- Notice any remaining flavors once the raisin is gone.
- Pay attention to the last remnants of the after taste as it slowly fades away.
- Please take off the headphones and return to the computer that was originally assigned to you and follow the instructions on the screen.
- Please take off the headphones and return to the computer that was originally assigned to you and follow the instructions on the screen.

C.3 Control Induction

The following instructions were administered over headphones to all participants in the control induction condition.

- Please take a few moments to settle in, relax, and get comfortable.
- Look at the environment you are in right now, take notice of your surroundings, and become familiar with their details.
- Bring your attention to the pen and sheet of paper in front of you.
- Slowly, pick up the pen on the table in front of you and draw whatever comes to mind.

- Allow your thoughts and feelings to take their own course, and follow them wherever they wish to go.
- Daydream freely
- Draw whatever comes to mind
- Daydream freely
- Draw whatever comes to mind
- Please stop drawing and place your pen back on the table
- Please stop drawing and place your pen back on the table

- Now that you have finished this exercise, I'd like to guide you through another task.
- Please continue to daydream, as you have already been doing.

- Bring your attention to the box of raisins on the table in front of you.
- Do any memories come to mind?
- Now, open the box of raisins in front of you.
- Take one raisin out of the box and eat it.
- As you chew it, please allow your mind to wander
- just think about whatever comes to mind.
- Daydream freely for the next few minutes
- Allow your thoughts and feelings to take their own course and follow them wherever they wish to go.
- Just think about whatever comes to mind.
- Allow your thoughts and feelings to take their own course and follow them wherever they wish to go.
- I'd like to guide you through this process one more time
- Bring your attention to the box of raisins on the table in front of you.
- Do any memories come to mind?
- Now, open the box of raisins in front of you.
- Take one raisin out of the box and eat it.
- As you chew it, please allow your mind to wander
- Just think about whatever comes to mind.
- Daydream freely for the next few minutes

- Allow your thoughts and feelings to take their own course and follow them wherever they wish to go.
- Just think about whatever comes to mind.
- Allow your thoughts and feelings to take their own course and follow them wherever they wish to go.
- Please take off the headphones and return to the computer that was originally assigned to you and follow the instructions on the screen.
- Please take off the headphones and return to the computer that was originally assigned to you and follow the instructions on the screen.

C.4 Negative Feedback

Experimenter: You are almost done. The only thing left for you to complete is a short listening game and a few more short questions. However, before you begin on that, I would like to share these results with you.

Experimenter: "I'd like to start by reminding you that all the information contained on this report and everything that you have entered into the computer, is completely confidential and will not be shared with anybody besides myself, and the principle investigator of the study. Also, It would be difficult for us to even match your name to any of this data. That being said, the reason we are sharing this information with you today is because we have found through previous studies that most people are genuinely interested in results pertaining to their personality traits. Just to refresh your memory, the various tests that you just took measure some of your personality traits. One such trait was extraversion—the first set of questions you answered. Just to make sure, are you familiar with what extraversion is?

Experimenter: Extraversion implies an energetic approach toward the social world. Extraverts tend to enjoy human interactions and to be enthusiastic, talkative, and socially gregarious with others. They take pleasure in activities that involve large social gatherings, such as parties and community activities.

Experimenter: So, when look at your report we can see that all of these traits were measured. And contain scores and percentile values. Your extraversion score is <SCORE> and the percent below value is <VALUE>. Now, don't pay attention to the actual score, because it isn't very informative. Each trait is assessed using a different measurement scale. So… for example, extraversion might be out of twenty, while abstractedness might be out of forty. The percent below value, on the other hand is very informative. What this value means is that if we took you and 99 other random people and put you in a room together, <VALUE> of those people would score lower than you on extraversion. Does that make sense?

This means that you are [not] very extroverted. Indicating that you have a [High, Low, or Balanced] need to interact socially with others. Would you say that this is an accurate reflection of your personality?

Experimenter: Extraversion is a good indicator of the types of relationships you will have, and has been used to measure this for a long time. However, recent research in personality and social psychology has found that several other personality traits interact with extraversion. This research has shown that when these other traits-- like Sensitivity, Dominance, and Apprehension—are used in conjunction with your extraversion score, a more accurate picture of your social relationship can be seen. In other words, Psychologists have found that when all of these personality traits are analyzed together, they can be used to predict the course and quality of your future relationships with other people. Does this make sense?

Experimenter: Okay. I am going to leave this report with you to look over. Take a look at your percentiles on the different traits, and then this [the line chart] is just a visual depiction of how all of these traits relate to one another. Then, a mathematically more complicated version of these relationships is used to place you into a personality type [point to negative feedback], which gives you a little information about what it would predict about your future social interactions. So go ahead and take a look and when I get back I will do my best to help if you have any questions.

APPENDIX D

(Materials)

D.1 Informed Consent Form

Informed Consent Form

Dear Participant:

This study is a computer-based experiment, designed to examine the role of attention on one's ability to willfully control their behavior. The study is being conducted by Professor Ernest Park of Cleveland State University and a graduate student in the experimental psychology program (Robert Goodman). This study has been approved by the Cleveland State University Institutional Review Board, and only exposes participants to a minimum level of risk.

All of your responses will be stored securely and will remain completely confidential. This means that only authorized researchers working in the CSU Social Psychology Lab will have access to your data.

You will begin by answering variety of questions about yourself. Then you will be asked to follow a set instructions administered over headphones. Next, you will play a two short word games using the computer and answer some additional follow-up questions about yourself.

Participation in this study will take approximately 60 minutes, and you will receive a half-hour of research credit for every 30 minutes you participate. Participation is voluntary and you may withdraw from the study at any time without penalty. While there are no direct personal benefits for your participation, you will be making a valuable contribution to science. Further, you will likely gain a better understanding of how psychology research is conducted.

For further information regarding this research, please contact:
Robert Goodman (goodman.rob@gmail.com; 513-602-0022) or
Dr. Ernest Park   (e.s.park@csuohio.edu; 216-687-3630)

If you have any questions about your rights as a research participant, you may contact the Cleveland State University Institutional Review Board (216-687-3630).

There are two copies of this form. After signing them, keep one copy for your records and return the other one to the experimenter. Thank you in advance for your cooperation and support.

Please indicate your agreement to participate by signing below.

I am 18 years or older, right-handed, have no hearing impairments, and have read and

understood this consent form and agree to participate.

Signature: _____

Name: _____ (Please Print)

Date: _____

Email: _____ (Optional)

<u>Mindfulness and Self-Control</u>

Psychologists have studied the impact of self-threatening information on the individual for a number of decades. Research shows that keeping attention focused on the present moment (mindfulness) can soften the impact of self-threatening information. While the majority of research has focused on the beneficial outcomes associated with mindfulness, very little research has explored the underlying mechanisms of mindfulness which might contribute to producing these benefits.

The current study was designed to explore a potential explanation behind why mindfulness works. Past research has indicated that when people receive self-threatening information, their ability to volitionally control subsequent behavior is hindered. For example, if a person is trying to control what they eat because they are on a diet, they will have a more difficult time sticking their diet after they perform poorly on a test, or if others insult them. We are interested in whether mindfulness serves to weaken the impact of self-threatening information on the individual and if this change will lead to a less deficits in one's ability to exert wilful control over subsequent behaviors.

In the current study, every participant is given self-threatening feedback about the future of their social relationships by the experimenter. This information is completely false, was developed by the researchers in advance, and has no relationship to you personally. No evaluation of your social relationships ever took place. It was important to give you this negative feedback to determine how it affected your ability to exert control over your behavior. We sincerely thank you for your contribution to this study and apologize for any distress this might have caused you.

We ask you to please refrain from discussing any aspects of this study with any other student at CSU. The integrity and quality of the study depends on your compliance to this request. We appreciate your consideration on this matter, as well as your time and willingness to participate in our research.

If you are interested in learning more about this area of research, information can be found in the following articles:

Brown, K. W., Ryan, R. M., Creswell, J. D., & Niemiec, C. P. (2007). Beyond Me: Mindful Responses to Social Threat. In H. A. Wayment & J. J. Bauer (Eds.), *Quieting the Ego: Research and Theory on the Benefits of Transcending Egoistic Self-Interest* (pp. 75-84). Washington, DC: American Psychological Association.

Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry, 18*, 211-237

Baumeister, R. F., Dewall, C.N., Ciarocco, N. J., & Twenge, J. M. (2005). Social
exclusion impairs self-regulation. *Journal of Personality and Social Psychology,
88,* 589-604.

If you have any questions about this research, please feel free to contact, Dr. Ernest Park
(216-687-9237; e.s.park@csuohio.edu), or Robert Goodman (513-602-0022;
goodman.rob@gmail.com). Thank you again for helping us with this research project.

APPENDIX E

(Relevant Images)

Left: Induction Area, Right: PC assigned to participant

Left: Induction Area, Right: PC assigned to participants

Contents on table in the induction area