# Is Mindfulness Beneficial for Job Performance Following Positive and Negative Affective Events? The Attenuating Role of Mindfulness on Self-Serving Bias

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## Abstract

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In line with the recent interest on the benefits of mindfulness by the popular media and industry leaders alike, mindfulness research and its effects on performance has also begun to flourish. Nonetheless, most previous research focused on mindfulness's direct, positive relationship with performance. Therefore, in this dissertation, I explored boundary conditions of this relationship by understanding how mindfulness can interrupt automatic cognitive processes following positive and negative affective events (i.e., self-serving causal attributions), which can either positively or negatively affect performance, depending on the valence of the event. Specifically, I examined how mindfulness's purported attenuation of self-serving bias can result in both increased and decreased levels of performance via repetitive thinking characteristics related to the affective event. Finally, I tested the full theoretical model with three studies. Study 1 was an experiment, which manipulated the affective event to examine its impact on causal attributions, repetitive thinking characteristics, and changes in performance. Study 2 was the same experiment as Study 1, but also included manipulations of both the affective event and participants' states of mindfulness. Finally, Study 3 involved a one-week long field experiment, which utilized

experience sampling methodology to understand these effects at the intra-individual level. Results from these studies lend preliminary support to the proposition that affective events may be a boundary condition of mindfulness's relationship with task performance in that it is potentially beneficial to performance during negative events and detrimental to performance during positive events.

*Keywords:* mindfulness, performance, affective events, self-serving bias, repetitive thinking

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## INTRODUCTION

In recent years, mindfulness has entered mainstream discussions across a wide range of areas, from medicine to management, and in these practices, its beneficial effects on performance are beginning to be explored. In Pickert's Time magazine cover article (2014) entitled, "The Mindful Revolution", the author references several physicians, Pentagon chiefs, Silicon Valley entrepreneurs, and FORTUNE 500 titans, who all regularly practice mindfulness meditation and tout its benefits in supporting the roles they serve within their respective organizations. Additionally, large corporations, such as Nike, General Mills, Target, and Aetna, teach employees to take advantage of the 'quiet times' (Hochman, 2013) to foster their development. Goldman Sachs and Farmers Insurance use mindfulness consultants to teach their employees job related mindfulness techniques (e.g., pausing before sending important emails) to help optimize their interactions with other employees and clients, as well as their performance. On a broader scale, a yearly business conference on mindfulness, Wisdom 2.0, has grown from 325 attendees in 2009 to over 3,000 attendees in 2016.

In line with the recent interest on the practical benefits of mindfulness by organizations and industry leaders, mindfulness research has begun to crossover from psychology journals to publications in management journal outlets. For example, Glomb, Duffy, Bono, & Yang (2011) provided a theoretical overview of the results of mindfulness processes and practices (e.g., response flexibility, decreased rumination, empathy, affective regulation, etc.) and how they can influence important work outcomes, such as job performance. Dane (2011) put forth an additional theoretical paper focusing on differentiating mindfulness from other similar cognitive processes, such as flow, counterfactual thinking, and their relationships with performance. As a follow-up to Dane (2011), Dane & Brummel (2013) reported that mindfulness was positively related to work performance in a dynamic service industry environment, even after accounting

for work engagement. Reb, Narayanan, & Chaturvedi (2012) examined supervisors' trait mindfulness reporting that it positively predicted employee performance through the fulfillment of employees' level of need satisfaction. Other empirical research examining the relationship between mindfulness and performance related outcomes has reported positive relationships with judgment accuracy (Kiken & Shook, 2011), insight-related problem solving (Ostafin & Kassman, 2012), academic performance (Shao & Skarlicki, 2009), cognitive flexibility (Moore & Malinowski, 2009), working memory capacity (Mrazek, Franklin, Phillips, Baird, & Schooler, 2013), and executive functioning (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010).

While the interest on mindfulness's effect on performance is growing rapidly, it is still an area of research that is relatively new to management research. Most previous research focused on the direct relationship between mindfulness and performance, and the evidence seems to suggest that this relationship is largely positive. Therefore, in this dissertation I explore boundary conditions of the relationship between mindfulness and individual, daily, in-role task performance and, specifically, how mindfulness affects individual, daily, in-role task performance (hereafter referred to as performance) in the face of both positive and negative affective events. Significant affective events refer to events that are personally construed to have an impact on goals that are important to the individual. These events are prevalent, regularly occurring, and are particularly jarring to one's well-being (Weiss & Cropanzano, 1996). Due to the important implications that positive and negative affective events can have on one's self-esteem, I set out here to examine how one's level of mindfulness may affect an individuals' susceptibility to cognitive biases, particularly to self-serving bias (Heider, 1958) following such events; and how this bias can either positively or negatively impact performance, depending on the valence of the affective event. Therefore, if mindfulness is effective at minimizing this bias

(as it has been shown to do with other cognitive biases (Hafenbrack, Kinias, & Barsade, 2014; Kiken & Shook, 2011), then the downstream performance effects may not always be beneficial.

We know from past research that the effect from individuals experiencing a significant affective event on subsequent performance is difficult to predict (Miner & Glomb, 2008). Why? First, absent the focus on mindfulness, the relationship between affect and performance itself is complex. Indeed, Forgas (1994), in discussing the difficulty of predicting how one's mood relates to task performance, stated that, "it appears that the nature of the target, features of the judge, and characteristics of the situation can all have a significant mediating influence on the quality and extent of mood effects on judgments" (p. 40), and by extension, task performance. Furthermore, research by Staw and colleagues (Staw & Barsade, 1993; Staw, Sutton, & Pelled, 1994; Wright & Staw, 1999) suggests conflicting predictions about the effects of positive and negative states on performance. For example, prior research has demonstrated that positive affective states facilitate creativity and efficacy judgments, whereas negative affective states can lead to a more thorough search for solutions and more accurate judgments (Brief & Weiss, 2002). Generally speaking, prior research does suggest that positive affect facilitates performance as opposed to negative affect (Staw & Barsade, 1993; Judge, Erez, & Bono, 1998; Lyubomirsky & King, 2005; Shockley, Ispas, Rossi, & Levine, 2012Kaplan, Bradley, Luchman, & Haynes, 2009;), but the cognitive mechanisms through which this occurs are less clear, particularly for state affect.

While there has been several (often times conflicting) studies on the relationship between affect and performance (as mentioned above) and solid theoretical work on the effects of affective events on performance (Beal, Weiss, Barros, & MacDermid, 2005; Weiss & Cropanzano, 1996), there have been few, if any, empirical studies on the effects of affective

work events on performance, particularly daily, intra-individual, task performance. Empirical studies of affective events have focused on its effects on CWB (Matta, Erol-Korkmaz, Johnson, & Bicaksiz, 2014), injustice toward coworkers (Spencer & Rupp, 2009), job attitudes (Lam, Yik, & Schaubroeck, 2002), injustice perceptions and retaliation (Barclay, Skarlicki, & Pugh, 2005), coping strategies (Brown, Westbrook, & Challagalla, 2005), and effects of energy availability (Zohar, Tzischinski, & Epstein, 2003). Furthermore, these studies either focus primarily on the effects of negative events (e.g., Barclay et al., 2005; Brown et al., 2005) or the affective mechanisms through which the affective event –outcome relationship occurs (e.g., Lam et al., 2002; Zohar et al., 2003). Therefore, given the importance of understanding how positive and negative affective events impact performance, there has been surprisingly little empirical research on this subject.

With this dissertation, I will explore how mindfulness can interrupt automatic cognitive processes associated with significant affective events (i.e., self-serving causal attributions), which can either positively or negatively affect performance, depending on the valence of the event. In addition, I focus on the cognitive, rather than the affective processes (i.e., self-serving bias and repetitive thinking characteristics) through which both positive and negative affective events can differentially affect performance. By doing so, I set out to examine how mindfulness's purported attenuation of self-serving bias can result in both increased and decreased levels of performance and cognitive reappraisals of the affective event. Cognitive reappraisals of the affective event (e.g., negative events reappraised as being less negative or even positive) may prove to be particularly important, since this reinterpretation of events may ultimately reduce the frequency and intensity of future affective event experiences, which can subsequently impact future task performance.

In the next section, I first describe the concept of mindfulness in more detail and differentiate trait and state mindfulness. Then, I present my theoretical model and related hypotheses, which is based on affective events theory, attribution theory, as well as prior mindfulness research. Finally, I present three empirical studies. Study 1 and 2 are experiments, which manipulate the affective event (Study 1) along with participants' mindfulness states (Study 2) to examine their impact on measures of causal attributions, repetitive thinking characteristics, and changes in performance.

Study 3 will involve a one-week long field experiment, which will utilize experience sampling methodology to better test the external and ecological validity of my proposed model by sampling actual affective work events and intra-individual performance at two separate time points each day. Lastly, Study 3 also compares the effectiveness of a mindfulness intervention against a control group who receive a business best-practice intervention.

## MINDFULNESS

The concept of mindfulness originated from the Buddhist *Abhidhammattha Sangaha* (Nārada, 1979; Buddhaghosa, 1976), and is the translation of the Pali term *sati*, or its Sanskrit counterpart *smrti*. The root meaning of the word *sati* literally translates 'to remember', but does not correspond to the Western conception of memory regarding a recollection of the past. Rather, *sati* is described as a reminder to return to a presence of mind or attentiveness to the present moment. As much as it is defined by what it is, it is also described extensively in Buddhist psychology by what it is not, a chief characteristic being 'not floating away' (Pali term *apilāpana*), and an absence of confusion or non-forgetfulness of the present moment (Nārada, 1979).

Brown and colleagues have formally defined mindfulness as a "receptive attention to and awareness of present events and experience" (Brown, Ryan, & Creswell, 2007: p. 212; Brown & Ryan, 2003). This state of consciousness has been distinguished from other more general psychological processes – namely, cognition, motives, and emotions (Averill, 1992; Mayer, Chabot, & Barlsmith, 1997). Therefore, one can be conscious of internal psychological processes, such as thoughts, motives, and emotions, just as one can be conscious of external stimuli. Similarly with Buddhist psychology, scholarly definitions of mindfulness is often described by what it is not; namely, it is a receptive awareness (background monitoring) and attention (focused conscious awareness) of internal and external stimuli *without* imposing judgments, evaluations, expectations, memories, meaning, or other self-relevant cognitive interpretations regarding what is perceived (Glomb et al., 2011; Brown et al., 2007; Brown & Ryan, 2003).

Drawing heavily from current mindfulness research (Brown et al., 2007; Glomb et al., 2011), for the purpose of this dissertation, I define mindfulness as, *a state of consciousness characterized by a receptive attention to and awareness of present events and experiences, without evaluation, judgment, and other self-relevant cognitive filters*. Included in this definition are six basic, interconnected characteristics of mindfulness that have been addressed in the literature (Brown et al., 2007; Hulsheger, Alberts, Feinholdt, & Lang, 2013; Glomb et al., 2011): 1) clarity of awareness, 2) non-conceptual, non-discriminatory awareness, 3) empirical stance toward and immersion in reality, 4) flexibility of awareness and attention, 5) present-oriented consciousness, and 6) stability or continuity of attention and awareness.

Building on the definition of mindfulness addressed above, first, mindfulness involves a *clarity of awareness* or bare, unfiltered attention towards one's inner and outer worlds, including

thoughts, emotions, sensations, and behaviors (Brown et al., 2007). Second, mindfulness is a *non-conceptual, non-discriminatory awareness* that does not involve secondary elaborative processing of thoughts, emotions, and sensations that arise in one's stream of consciousness. In other words, thoughts, emotions, and sensations are welcomed and not suppressed, but cognitively processing these thoughts, feelings, and sensations through rumination, judgment, evaluation, comparisons, categorizations, etc. are outside the realm of what constitutes mindfulness (Bishop, Lau, Shapiro, Carlson, Anderson, Carmody, Segal, Abbey, Speca, Velting, & Devins, 2004). Third, mindfulness involves an *empirical stance toward and immersion in reality*, such that one who is mindful is a less biased observer, who is both fully aware of his/her experience while being fully immersed in it. Fourth, mindfulness is *flexible* in that one can have a larger perspective on all that is currently salient (i.e., clear awareness of inner and outer environment), and one can also have mindful, focused attention on a particular object (i.e., focused attention on inner (e.g., thoughts, emotions, etc.) or outer stimulus (e.g., tree, candle, etc.). Fifth, mindfulness is oriented firmly in the present moment of reality whereby the individual is not preoccupied with thought-generated accounts of the past, future, or even present happenings. Finally, mindfulness is an inherent capacity that varies in strength and steadiness both between and within individuals.

In sum, mindfulness is a state of consciousness characterized by a receptive attention to and awareness of present events and experiences, without evaluation, judgment, and other self-relevant cognitive filters. In this dissertation, I discuss: 1) how this state of consciousness can help attenuate the self-serving bias in the face of both negative and positive events, and 2) the downstream implications the attenuation of this bias has on performance (which may or may not be positive). While mindfulness is typically defined and conceptualized as a state, it has also

empirically demonstrated trait-like properties (e.g., Brown & Ryan, 2003; Brown et al., 2007; Hulsheger et al., 2013). Below I elaborate on the trait and state properties of mindfulness and how they relate to this study.

**Trait and State Mindfulness**

Mindfulness research that has been conducted on the general population (hereafter referring to non-clinical samples without formal meditation experience) has shown that trait mindfulness varies between individuals and can be measured reliably with self-report scales designed specifically for those without any formal mindfulness training (e.g., Hulsheger et al., 2013, Brown et al., 2007). Reis, Sheldon, Gable, Roscoe, & Ryan (2000) describe trait (between-person) effects as stable individual differences that relate to average levels of an outcome over time. As such, most mindfulness research that has been conducted with the general population has focused on examining the effects of trait mindfulness (as opposed to state mindfulness) on behavior regulation and psychological health (e.g., Brown & Ryan, 2003; Brown et al., 2007; Brown & Cordon, 2009; Allen & Kiburz, 2012; Bowlin & Baer, 2012, etc.).

Ironically, despite the prevalence of mindfulness research focusing on trait mindfulness, most researchers conceptualize and define mindfulness as being a psychological state of *moment to moment* awareness of one's inner and outer experience that varies both *within* and *between* persons (Brown & Ryan, 2003; Glomb et al., 2011). Reis et al (2000) described trait (between-person) and state (within-person) effects as being conceptually and statistically independent, where state effects were represented by systematic fluctuations above and below a person's average level on a particular variable/construct (i.e., trait).

Empirical research that has focused on mindfulness's state effects can be grouped into two categories: outcome effects resulting from 1) induced states of mindfulness through mindfulness interventions (e.g., Eberth & Sedlmeier. 2012; Chiesa & Serretti, 2009; Zeidan, Johnson, Diamond, & David, 2010) and 2) daily, naturally varying states of mindfulness (e.g., Brown & Ryan, 2003; Hulsheger et al., 2013), Weinstein, Brown, & Ryan (2009), and Hulsheger et al (2013)). To date, prior research on induced states of mindfulness far exceeds research on daily (or other repeating time period), fluctuating states of mindfulness.

In this dissertation, I examine how both naturally occurring and induced states of mindfulness affect both inter- and intra-individual performance via the attenuation of self-serving causal attributions concerning an affective event. Specifically, I use both affective events and attribution theory as the principle theoretical frameworks to explain how both positive and negative events trigger self-serving attributions, which then, in turn, either positively or negatively affect performance through self-serving bias's effect on repetitive thinking associated with the event. Second, I theorize on how mindfulness can attenuate self-serving bias, which may then either positively or negatively affect performance, depending on the nature of the event. Third, I provide details on how I will empirically test my full theoretical model (see Figure 1) with two experiments, in which I will manipulate positive and negative events (Study 1) and states of mindfulness (Study 2) to examine their effects on performance. Finally, I describe in detail how my proposed model will be tested in the field with real affective events, a mindfulness intervention, and intra-individual measures of performance using a one-week diary study and experience sampling methodology.

< Insert Figure 1>

# THEORETICAL MODEL

## Affective Events Theory and Affective Events

Using Affective Events Theory (AET), which explains the role of events as proximal causes of affective reactions (Weiss & Cropanzano, 1996), I intend to explore how a mindfulness state can moderate the relationship between an affective event and work performance. AET helps to explain the structure, causes, and consequences of affective events at work. I define an affective event as it is generally defined in AET, a change in circumstances during a particular period that generates a significant emotional reaction or mood change in people.

Affective events theory utilizes cognitive theories of emotion, specifically, a two stage cognitive appraisal process in describing how an event can elicit an emotional reaction. The initial or primary appraisal consists of an appraisal associated with one's "concern relevance" associated with the event (Frijda, 1993). This is an initial assessment of whether or not the event is: a) "goal relevant" or tied to one's personal set of goals and values; and b) "goal congruent" or consistent (beneficial) or inconsistent (harmful) with personal desires and concerns (Lazarus, 1991). It has been suggested that the intensity of the emotion is directly correlated with the importance or desirability of the goal, while the general polarity of the emotion is directly correlated with whether the event is goal congruent (positive emotions) or incongruent (negative emotions). In sum, primary appraisals of affective events involve an assessment of whether the event is good or bad and how relevant the event is to an individual's goal, which may also include an individual's well-being (Smith, Hanes, Lazarus, & Pope, 1993).

Following the primary appraisal, the secondary appraisal process involves a more in-depth, interpretive "meaning analysis" (Smith & Pope, 1992) of the event, in which

environmental cues related to the event are evaluated using several dimensions (e.g., coping potential, certainty of outcome, who is responsible, etc. (Lazarus, 1991; Roseman, 1984)). While the primary appraisal process is deemed to be automatic and elicits general emotional appraisals (i.e., positive or negative), the secondary appraisal process involves a much more elaborate process of assessment (see aforementioned dimensions), and in response, elicits discrete emotions (i.e., anger, fear, joy, sadness, etc.) based on the outcome of these assessments. Due to the automatic nature of the primary appraisal process, it is unlikely to have large effects on an individual's performance (Beal et al., 2005). Therefore, I focus primarily on the secondary, sense-making process, and more specifically, on the role causal attribution bias plays in influencing this process, and in turn, how it can either negatively or positively impact performance.

Finally, AET purports that affective events have both direct and indirect effects on employee behavior. In the direct case, Weiss and Cropanzano (1996) argue that affective events may elicit affect-driven behaviors, such as spontaneous helping and/or harming. Alternatively, in the indirect case, the authors argue that affective events may also elicit judgment-driven behaviors, where affective events can alter attitudes and judgments that in turn elicit purposeful behavior (e.g., searching for new employment). In line with the indirect effects of affective events, I focus on the cognitive mechanisms through which causal attributions, namely self-serving bias, affect performance.

In sum, I am interested in examining how mindfulness can attenuate the performance effects of significant affective work events (hereafter referred to as an "negative/positive event" or "affective event"), which based on the above, imply events that represent the following characteristics: 1) highly goal relevant and important; 2) goal incongruent for negative events

and goal congruent for positive events; 3) and that result in a generalized affective reaction (negative or positive). Specifically, in this dissertation I will focus on integrating both attribution theories with AET to better understand and examine: 1) how affective events can indirectly affect task performance through causal blame attributions and repetitive thinking characteristics; and 2) how mindfulness can attenuate the prevalent attributional bias (i.e., self-serving bias) that is prone to arise from such events.

**Linking Affective Events and Self-Serving Bias**

Attribution or causal attribution theory refers to the study of perceived causation, while attribution refers to the perception or inference of cause (Kelley & Michela, 1980). "Attribution" research involves the systematic assessment or manipulation of antecedents, while "attributional" research concerns the consequences of attributions. In both cases, causal attributions play a central role in human behavior: attribution research constitutes an individual's understanding of the causal structure of his/her world, while attributional research constitutes how s/he interacts with that world based on the attributions s/he makes. In this study, I integrate both attribution and attributional research to examine how attributional bias, namely self-serving bias, mediates the relationship between affective events and performance outcomes and how mindfulness moderates this relationship.

Self-serving bias (Miller & Ross, 1975) refers to the tendency for individuals to make internal attributions for positive outcomes and external attributions for negative outcomes (Blaine & Crocker, 1993). An internal attribution refers to causal perceptions or judgments related to personal traits, abilities, or efforts, while an external attribution refers to causal perceptions or judgments related to other people's traits or behaviors, environmental contingencies or circumstances, or luck (Heider, 1958; Weiner, 1985). In other words, self-

serving bias can be seen as judgments or interpretations of oneself, one's behavior, and the behavior of others to explain events in ways that are *favorable to the self*. Therefore, in the case of positive events, the self-serving bias serves to self-enhance and improve an individual's level of self-esteem by attributing successes to oneself (internal attributions), while in the case of negative events, this bias serves to protect self-esteem by attributing failures to causes other than oneself (external attributions) (Blaine & Crocker, 1993; Shepperd, Malone, & Sweeny, 2008).

Significant affective events are rife with motivational opportunities to display self-serving bias. Recall that affective events are of high goal relevance and importance, are goal incongruent (in the case of negative events) and goal congruent (in the case of positive events), and that result in a generalized affective reaction (Weiss & Cropanzano, 1996). Since significant affective events are represented by high goal relevance and importance, these events are highly self-relevant, and consequently, such events encompassing achievements or failures of important goal(s) should be integral to levels of self-esteem and self-worth (Miller, 1976). Therefore, in order to preserve and/or enhance one's self-esteem or self-worth, it would be expected, based on the self-serving motivations associated with this bias, that one would claim responsibility for positive affective events, while rejecting responsibility for negative affective events.

This prevalent positivity bias (Heine, Lehman, Markus, & Kitayama, 1999) is a robust and widely demonstrated phenomenon in the human cognition literature (for several comprehensive reviews see Anderson, Krull, & Weiner, 1996; Blaine & Crocker, 1993; Bradley, 1978; Campbell & Sedikides, 1999; Greenberg, Pyszczynski, & Solomon, 1982; Heider, 1958; Miller, 1976; Miller & Ross, 1975; Sedikides & Strube, 1995; Zuckerman, 1979, etc.). For example, in a meta-analysis conducted by Mezulis, Abramson, Hyde, & Hankin (2004), the authors examined the magnitude, ubiquity, and level of adaptiveness concerning this bias across

266 studies and 503 samples, reporting a large bias effect (average $d$ = 0.96). While there was some significant variability across age, psychopathology, and culture, these findings confirm that the self-serving attributional bias is pervasive in the general population.

Based on the review of the self-serving bias literature and affective event theory, I propose to test the following hypothesis (see Figure 1):

> *Hypothesis 1a*: Affective events are positively related to one exhibiting self-serving bias, such that positive events are positively related to internal causal attributions.

> *Hypothesis 1b*: Affective events are positively related to one exhibiting self-serving bias, such that negative events are positively related to external causal attributions.

**Self-Serving Bias, Performance and Repetitive Thinking Characteristics**

A growing body of research suggests that the self-serving attribution bias is an adaptive feature of human cognition and is associated with a host of beneficial outcomes (Mezulils et al., 2004). For instance, self-serving bias has been associated with greater trait happiness (Kuiper, 1978; Rizley, 1978), lower levels of depression (Abramson & Alloy, 1981), higher positive mood states (McFarland & Ross, 1982), better problem solving (Isen & Means, 1983), improved immune functioning (Taylor, Klein, Lewis, Gruenewald, Gurung & Updegraff, 2000) and lower mortality and morbidity rates (Peterson & Seligman, 1987). Moreover, a reversal of self-serving attributional bias has been associated with greater depression (Sweeney, Anderson, & Bailey, 1986) and worse physical health (Lee & Seligman, 1997; Peterson, Seligman, & Vaillant, 1988).

However, the beneficial effects of self-serving bias are not as straight-forward as suggested. These studies tend to compare the effects of self-serving bias following positive events with the reversal of self-serving bias (e.g., learned helplessness, where positive events are

attributed to external factors and negative events are attributed to internal factors), which is not necessarily an attenuation of self-serving bias, but rather, a type of "self-harming" bias, so to speak. In addition, the direct and indirect effects of self-serving bias on performance are less well understood due to the minimal amount of empirical research in this area and the conflicting performance effects of self-serving attributions related to positive and negative events, of which I detail below.

In a line of research on individuals' explanatory style tendencies and its effect on performance, researchers have uncovered the following 4 styles: 1) a pessimistic explanatory style for failures, characterized by internal, stable and global attributions; 2) a pessimistic explanatory style for successes, characterized by external, unstable and specific attributions; 3) an optimistic explanatory style for failures, characterized by external, unstable and specific attributions; and 4) an optimistic explanatory style for successes, characterized by internal, stable and global attributions. Examining these respective styles, researchers have shown that students who explained negative academic events with internal, stable and global causes (i.e., pessimistic explanatory style for failures) received lower grades during their freshman year compared to students who used external, unstable and specific causes (i.e., optimistic explanatory styles for failures), even after controlling for depression and ability (Peterson & Barrett, 1987). In another work-related study, insurance salespersons with optimistic explanatory styles sold 37% more insurance in their first 2 years of service and remained in their job twice as long as those with pessimistic explanatory styles (Seligman & Schulman, 1986). This robust finding has been replicated with athletic performance (Seligman, Nolen-Hoeksema, Thornton, & Moe, 1990), academic performance, as mentioned above, (Dweck & Licht, 1980; Nolen-Hoeksema, Girgus,

& Seligman, 1986), and with depressed patients, prisoners and children (see Peterson & Seligman, 1984 for review).

However, explanatory style studies only shed partial light on the question of how self-serving attributions affect performance outcomes. First, self-serving bias focuses on external and internal attributions (Campbell & Sedikides, 1999). In explanatory style studies, the results of external versus internal attributional effects on performance are confounded with stable versus unstable and global versus specific attributional judgments. Second, internal attributions of failures do not necessarily indicate an absence or attenuation of a causal attribution bias, particularly in the case of pessimistic explanatory styles, where participants make internal, stable, and global causal attributions for failures; this phenomenon is more a reflection of a type of "self-harming bias" associated with learned helplessness (Abramson, Seligman, & Teasdale, 1978; Seligman, Abramson, Semmel, & von Baeyer, 1979). Since this "self-harming" bias associated with learned helplessness is typically found in samples with diagnosed psychopathologies (e.g., depression, anxiety disorders, attention-deficit/hyperactivity disorder, etc.) (Mezulis et al., 2004), and I am primarily interested in the non-clinical, general population, the effects of the "self-harming" bias (i.e., tendency to make internal attributions for failures) are out of the scope of this paper. Finally, the explanatory style research paradigm consists of comparing optimistic styles with pessimistic styles, reporting that optimistic styles are more beneficial for performance; whereas, here, I am interested in comparing, essentially, optimistic explanatory styles for failures' (i.e., self-serving bias for failures) and optimistic explanatory styles for successes' (i.e., self-serving bias for successes) effects on subsequent performance with non-biased, attributional effects on subsequent performance (i.e., performance after no

event or unbiased attribution of event occurs). Prior research examining these comparative effects has been inconclusive.

The level of control associated with internal attributions is also theorized and empirically shown to affect performance. For instance, in a field study (Noel, Forsyth, & Kelley, 1987), students who were failing a college course tended to attribute external, uncontrollable causes to their poorer performance. Noel et al. (1987) theorized that if unsuccessful students' attributions were shifted away from a self-serving pattern (i.e., external attributions) to where they attributed negative outcomes to internal factors they could control (e.g., effort and motivation), then this more controllable attribution would promote better subsequent student performance. Supporting this claim, when students were exposed to information suggesting that grades in college were caused by internal, controllable factors, they earned higher grades than those students in the control condition. Other educational (e.g., Dweck, 1975; Miller, Brickman, & Bolen, 1975; Schunk, 1983) and clinical (Forsyth & Forsyth, 1982) studies have also reported similar, positive outcomes, where internal, controllable causal beliefs/attributions resulted in better performance.

These findings suggest that self-serving bias following negative events may not be beneficial to future performance, since negative events are often attributed to external, uncontrollable factors. In contrast, self-serving bias following positive events may be helpful to promoting future performance, since positive events are often attributed to internal, controllable factors. While I recognize that there are internal factors that are less controllable (e.g., ability) and external factors that are more controllable (e.g., influencing others), the position I take here is that internal factors as a whole are generally more controllable than external factors, since all other things being equal, one has more control over one's own affect, cognition, and behavior than something external.

In line with the aforementioned self-enhancement and self-preservation motives inherent in self-serving bias, one would attribute positive events or outcomes to internal, *controllable* causes in order to claim the most responsibility for the outcome and ultimately improve self-esteem; on the other hand, one would attribute negative events or outcomes to external, *uncontrollable* causes in order to deflect as much responsibility onto someone or something else in order to preserve or protect one's self-esteem. Prior research supports this assertion (Alicke, 1985; Wann & Schrader, 2000). In sum, self-serving bias will be positively related to performance for positive events and negatively related to performance for negative events (see Figure 1).

*Hypothesis 2a:* Self-serving attributions following positive events will be positively related to performance.

*Hypothesis 2b*: Self-serving attributions following negative events will be negatively related to performance.

Finally, allocation of one's cognitive resources should also play a significant role in determining whether self-serving bias is beneficial or detrimental to one's performance outcomes (Beal et al., 2005). Recall that primary appraisal of an event involves a relatively automatic assessment of: 1) whether the event is positive or negative, and 2) how relevant that event is to one's well-being (Smith et al., 1993). However, after this initial appraisal, people engage in a much more elaborate secondary appraisal process, which involves an assessment of coping potential, accountability, and expectations related to the event, to name a few (Smith & Kirby, 2001). Since attributions are related to an individual's efforts to explain the occurrence of events (Anderson et al., 1996), they are likely to be an influential factor in the secondary appraisal

process. Such elaborations on causality in the secondary appraisal process can be cognitively demanding and either contribute to or detract from performance activities/outcomes (Clore, 1994).

In addition, negative, uncontrollable repetitive thoughts can consume cognitive resources that could otherwise be allocated to enhancing one's performance. For example, rumination, one such aversive, uncontrollable thought, is defined as "a class of conscious thoughts that revolve around a common instrumental theme and can reoccur in the absence of immediate environmental demands requiring thoughts" (Martin & Tesser, 1996: p. 7). Rumination typically arises from failure to progress toward a goal and generally consists of themes associated with that failure (Segerstrom, Stanton, Alden, & Shortridge, 2003). Therefore, negative valence rumination should be related to negative events, which are events that detract from goals, and associated causal blame attributions, which are external and less controllable.

Because self-serving attributions in the course of negative events are external and, arguably, construed to be outside of one's control, the event is likely to remain open in the mind of an individual (e.g., no apology is given and the opportunity to retaliate still exists). As a result, the individual is likely to ruminate over the event. Therefore, the event would likely be subjected to an intensive appraisal process, resulting in a longer duration of negative valence emotions, which are also likely to interfere and detract from the task at hand (Beal et al., 2005). Additionally, because of the external, less controllable causal attribution of the negative event, rumination under these conditions should be in the searching purpose mode, defined as "exploring, considering possibilities, or expressing confusion" (Segerstrom et al., 2003, p. 916) when trying to make sense of the negative event. This is consistent with the cognitive explanation of self-serving bias, which states that negative events would be scrutinized more

heavily due to negative implications for self-esteem and negative outcomes being inconsistent with positive expectations (Shepperd et al., 2008). Consequently, because of the importance of the event to the individual (as evidenced by his/her strong emotional reaction to the event following the primary appraisal process), the uncertainty over why the negative or goal inhibiting event occurred, and the perceived lack of control in resolving it, this searching form of open-ended appraisal should consume greater amounts of cognitive resources than if no negative event occurred.

The searching purpose of rumination is also associated with greater negative arousal, which has been shown to negatively affect performance by limiting a person's total capacity to process information (Kahneman, 1973), and by minimizing controllability of thoughts (Clark, 1986; England & Dickerson, 1988; Segerstrom et al., 2003). Furthermore, due to the self-protecting nature of self-serving bias following negative events (attributing causes of negative events to others or the situation) combined with the uncontrollability of thoughts during the negative event, the searching purpose associated with causal attributional thoughts is unlikely to lead to cognitive reappraisal of the event (i.e., changing the trajectory of the original affective event by reinterpreting the valence of the event (i.e., from primarily negative valence to more neutral or more positive valence) and the causal attribution of the event (i.e., from primarily external attributions to more neutral or more internal attributions). Indeed, one can conclude that searching forms of repetitive thinking, operationalized here as unproductive, persistent thoughts without cognitive reappraisal should mediate the relationship between self-serving bias of negative events and intra-individual performance.

*Hypothesis 3a:* Searching forms of repetitive thinking characteristics (i.e., unproductive thinking, persistent thinking, and no cognitive reappraisal of the affective event) will

mediate the negative relationship between external, self-serving attributions following negative events and performance, such that: 1) external self-serving attributions will be negatively related to productive thinking, and productive thinking will be positively related to performance,

*Hypothesis 3b:* 2) external self-serving attributions will be positively related to persistent thinking, and persistent thinking will be negatively related to performance, and

*Hypothesis 3c:* 3) external self-serving attributions will be negatively related to cognitive reappraisals of the affective event, and cognitive reappraisals will be positively related to performance.

Though not as pervasive in repetitive thinking research due to its underrepresentation among commonly used repetitive thinking measures, positive, repetitive thinking occurs and exists in the form of basking, anticipating, reminiscing, savoring, daydreaming, etc. (e.g., Bryant, 1989; Singer, 1975; Taylor & Armor, 1996; Wyer, 1996), as well as positive rumination, defined as rumination with positive valence thought content (Martin & Tesser, 1996; Watkins, 2008). In addition, experimental evidence has shown that negative thoughts are not inherently less controllable than positive thoughts, but rather, it is the emotional intensity of either valence that minimizes controllability (Clark, 1986; England & Dickerson, 1988). However, in naturalistic situations, negative repetitive thinking appears to be less controllable than positive repetitive thinking (Segerstrom et al., 2003). Therefore, research on positive repetitive thinking warrants more attention, since research in this area is scarce and has the potential to play a prominent role in promoting adaptive thinking, behavior and performance.

In the case of self-serving bias following a positive event, one's thinking related to the positive event is likely to be under control and resolved, since, unlike negative events, positive events are typically more consistent with one's positive expectations (Shepperd et al., 2008). First of all, expectations are often based on one's previous experience (Kelley &Michela, 1980; Tetlock & Levi, 1982), and due to physiological, cognitive, and behavioral responses that serve to dampen, mute, and even erase the impact of negative events, but not prior positive events (Taylor, 1991), positive experiences are often easier to recall than negative ones (Linton, 1986; Matlin & Stang, 1978). Second, positive outcomes are consistent with expectations related to one's self-view, since one's self-view is typically overly positive (e.g., above average and comparative optimism effects (Chambers & Windschitl, 2004)) (Taylor & Brown, 1988; Tetlock & Levi, 1982). Third, positive expectations are often accompanied by goal-directed behavior; people often engage in goal-directed actions and expect that those actions will produce desired outcomes (Miller & Ross, 1975).

Therefore, thoughts related to positive events should be associated with a *solving minded* purpose, defined as "trying to narrow down, to make sure, to make plans or to declare knowledge" (Segerstrom et al., 2003), rather than a *searching minded* purpose, which if utilized here, could jeopardize positive, internal attributions, and consequently, place an individual's resulting higher self-esteem at risk. For this reason, cognitive reappraisals of internal attributions of positive events would be less likely as well. Finally, since repetitive thinking with a solving purpose is associated with a less aroused effect (Segerstrom et al., 2003), positive thoughts resulting from internal causal attributions following positive events should be more easily controlled and less susceptible to over-consumption of cognitive resources.

In sum, solving forms of repetitive thinking, operationalized here as productive, non-persistent thoughts without cognitive reappraisal, should mediate the relationship between self-serving bias following positive events and performance (see Figure 1).

*Hypothesis 4a:* Solving forms of repetitive thinking characteristics (i.e., productive thinking, non-persistent thinking, and no cognitive reappraisals of the affective event) will mediate the positive relationship between internal, self-serving attributions following positive events and performance, such that: 1) internal self-serving attributions will be positively related to productive thinking, and productive thinking will be positively related to performance,

*Hypothesis 4b:* 2) internal self-serving attributions will be negatively related to persistent thinking, and persistent thinking will be negatively related to performance, and

*Hypothesis 4c:* 3) internal self-serving attributions will be negatively related to cognitive reappraisals of the affective event, and cognitive reappraisals will be positively related to performance.

**The Moderating Role of Mindfulness**

In alignment with self-serving bias's effects on preserving and enhancing the Self, mindfulness research describes the popular Western cultural attitude as one that emphasizes the primacy of the ego or constructed self (Brown et al., 2007). Similarly, the dominant view of self in Western psychology, referred to as the "self-as-object" (McAdams, 1990; Mead 1934; Cooley, 1902), describes the self as a concept that is largely internalized based on the reactions and opinions of others (Ryan & Brown, 2003). In other words, one's self-concept is defined as

involving self and others' appraisals of one's attributes, behaviors and accomplishments. These appraisals make up the evaluative schema that constitutes one's self-esteem.

One type of self-esteem that is consistent with the view of "self-as-object" is labelled as *contingent self-esteem*, which is defined in Self-Determination Theory (SDT) as self-esteem that is dependent upon reaching certain standards, appearing certain ways, and/or accomplishing certain goals, all of which are based on an introjected type of motivation (i.e., internalization of the contingent regard of significant others (Deci & Ryan, 1985; Ryan & Connell, 1989)) to appear worthy to self and others (Deci & Ryan, 1995; Ryan & Brown, 2003). This pervasive view of the self and self-esteem is the driving force behind self-serving bias.

Despite the prevalence of contingent self-esteem, there is another form of self-esteem, labelled *non-contingent self-esteem*, where the issue of self-esteem, as defined above, is not salient, largely because individuals with non-contingent self-esteem "experience themselves on a fundamental level as worthy of esteem and love" (Ryan & Brown, 2003; p. 72). In other words, successes and failures do not impact their self-worth, even when such information causes them to reassess their actions and efforts. This perspective is in line with Buddhist psychology, where one is only fully functioning when one is acting authentically (i.e., in line with one's own interests and values), rather than by esteem-related contingencies (Hanh, 1998), such as acting to fulfill the expectation of important others or succumbing to societal pressures.

From the Buddhist psychological viewpoint (where mindfulness originates from), both high and low levels of self-esteem are problematic, since, in both cases, there is an implied self-concept that makes one vulnerable to suffering. While there may be certain situations when self-esteem is high (e.g., others perform worse than you on a self-defining trait), as long as one

identifies with the self-concept, there will inevitably be times when one does not live up to the self-concept one has created (e.g., others perform better than you on a self-defining trait) (Ryan & Brown, 2003). However, mindfulness can help individuals to step outside of their self-concept to view it more objectively – as a creation of thought – and subsequently, escape related defensive mechanisms associated with its preservation (i.e., self-serving bias) by providing greater clarity of awareness, non-conceptual and nondiscriminatory awareness, an empirical stance toward reality, and present-oriented consciousness (Brown et al., 2007).

As described earlier, mindfulness is associated with one's clarity of awareness or a bare awareness of one's inner and outer worlds, including thoughts, emotions, actions, surroundings, etc. at any given moment, that is unbiased by conceptual thought (i.e., the self-concept and ego investment) (Brown et al., 2007). Mindfulness facilitates this through non-judgment and acceptance of all internal and external 'objects' that enter one's consciousness. Similarly, non-conceptual, nondiscriminatory awareness is characterized as direct contact with one's reality, rather than my perception of reality, which is filtered through cognitive processing and unconscious mechanisms/motives, such as those associated with one's self-serving bias. The mindful mode of processing is pre- or para-conceptual (c.f., Marcel, 2003); "it does not compare, categorize, or evaluate, nor does it contemplate, introspect, reflect, or ruminate upon events or experiences based on memory" (Brown et al., 2007: p. 213; Brown & Ryan, 2003; Teasdale, 1999). This way of thinking and processing, not only aids in preventing self-serving biases from forming, but it should also help with the consequences of self-serving beliefs when they emerge (e.g, rumination).

Mindfulness also allows one to develop the ability to disengage from and observe all content, including thoughts and related cognitions (e.g., mental images, narratives, etc.), as non-

valence objects unrelated to the self. As a result, cognitive objects become less susceptible to beliefs, prejudices and other cognitive biases. Similarly, accompanying emotions are simply seen as non-valence reactions to thoughts. Therefore, through these characteristics of mindfulness, identification with one's self-concept is relinquished and events are able to be evaluated more objectively; in other words, the self-preservation and self-enhancing nature of self-serving bias should be minimized when one is in a mindful state, or at the very least, should be seen for what it is, an object of thought, at the moment it is occurring. Similarly, a mindful "empirical stance toward reality" describes a sincere intention to be an *objective scientist,* who seeks accurate knowledge regarding some phenomenon (e.g., Rahula, 1974; Smith & Novak, 2004; Brown et al., 2007), as opposed to a naïve scientist who seeks to preserve or enhance one's self esteem through cognitive distortions/attributions (e.g., Heider, 1958; Nisbett & Ross, 1980) associated with self-serving bias.

Moreover, the present-oriented consciousness of mindfulness refers to focusing one's thoughts on the present moment, rather than "time traveling" to past memories and expectations about the future. The time traveling abilities of the mind serves the important purpose of protecting, maintaining, and enhancing the self through the pursuit of goals (Sheldon & Vansteenkiste, 2005), all of which are highly relevant to the self-serving attribution reactions to affective events or events that represent important goal outcomes. The present-orientation of mindfulness also serves to prevent one from forming or identifying with expectations (future oriented cognitions); and therefore, one is less apt to fall prey to the self-serving, cognitive processing of whether or not an outcome is consistence with expectations.

Finally, there have been several empirical studies, which provide support for the mindfulness characteristics described above, such as its ability to sustain one's attention on the

current moment, to process more information, and to reduce reactivity and defensiveness to ego or self-threatening information (see Carlson, 2013 for a detailed review). Taken together, this prior empirical research has important implications on self-serving bias and individuals' objectivity during information processing. To name a few examples, those trained in mindfulness showed superior executive attention skills (e.g., Chambers, Lo, & Allen, 2008; Hodgins & Adair, 2010); and both trait mindfulness and mindfulness training were associated with less reactivity and a greater willingness to experience negative emotions (e.g., Arch & Craske, 2006; Creswell, Way, Eisenberger, & Lieberman, 2007). Finally, in a recent line of research, mindfulness training has also shown de-biasing effects on sunk-cost bias (Hafenbrack et al., 2014) and negativity bias (Kiken & Shook, 2011). Therefore, based on the research reviewed above, I will test the following hypotheses:

*Hypothesis 5a:* The indirect effect of positive events on performance via self-serving bias is moderated by mindfulness, such that this relationship is weaker when state mindfulness is high.

*Hypothesis 5b:* The indirect effect of negative events on performance via self-serving bias is moderated by mindfulness, such that this relationship is weaker when state mindfulness is high.

*Hypothesis 5c:* The indirect effect of positive events on repetitive thinking dimensions via self-serving bias is moderated by mindfulness, such that this relationship is weaker when state mindfulness is high.

*Hypothesis 5d:* The indirect effect of negative events on repetitive thinking dimensions via self-serving bias is moderated by mindfulness, such that this relationship is weaker when state mindfulness is high.

## METHODS

The purpose of Study 1 was to test hypotheses 1 through 4 of the proposed theoretical model in a laboratory context, specifically to test: 1) if self-serving attributions mediated the relationship between affective events and performance; and 2) if repetitive thinking characteristics mediated the relationship between self-serving attributions and performance. In this study, I manipulated negative and positive affective events to test their impact on causal attributions, repetitive thinking characteristics, and performance.

The purpose of Study 2 was to test hypotheses 5 of the proposed theoretical model in a laboratory context, namely to see: 1) if mindfulness states attenuate the effect between an affective event and self-serving bias, and 2) how these mindfulness states affect the downstream effects of self-serving bias on performance through differing types of cognitive activity. Second, in this study, I manipulate negative and positive affective events along with participants' mindfulness states to test their interaction effect on self-serving bias, repetitive thinking characteristics, and performance.

Finally, Study 3 involved a week long field experiment, which utilized experience sampling methodology to better test the external and ecological validity of my proposed model by sampling actual affective events and intra-individual performance at two separate time points each day. Experience sampling methodology, in which daily diary surveys are deployed to capture multiple points of real-time thoughts and emotions, is ideal to use in this study, since this

methodology allows one to examine psychological processes in more detail and on a real-time basis in field settings. Furthermore, the psychological processes of interest (e.g., state mindfulness, affective events, causal attributions, cognitive activity following events) in this study vary over time within individuals and are not well modeled by between-person analysis methods alone. Third, participants' attempts to recall and describe such occurrences in cross-sectional, one time surveys could become too inaccurate to serve as operationalizations of actual experiences, behaviors, and states as they originally occurred (Beal & Weiss, 2003). Lastly, Study 3 also tests the effectiveness of a randomly assigned mindfulness intervention condition. Specifically, the study focuses on how the mindfulness intervention compares with a control condition of business best-practices in attenuating the effects of affective events on performance.

**Study 1**

**Participants and Procedure.** 210 undergraduates from a university in the Pacific Northwest participated in this study (107 male and 101 female - 2 participants did not disclose their age; mean age = 22.66 years, *SD* = 3.45, age range = 19-47). Participants were greeted by an experimenter who was blind to the hypotheses and were escorted to semi-private cubicles. After signing the consent form, participants first completed a brief survey consisting of control variables followed by a test assessing their spatial reasoning skills. After completing the test, participants were randomly assigned to one of three experimental conditions: a false positive performance feedback condition, a false negative performance feedback condition, and a no-feedback control condition (more details in the measures and manipulations section below). After the initial task, all participants were asked several causal attribution questions assessing their beliefs on why they either performed well or poorly.

Part 2 of the experiment tested the second stage mediating effect of self-serving bias on task performance through repetitive thinking characteristics. After Part 1, participants completed a similar spatial reasoning test in order to assess task performance following a self-serving judgment. After completing the second version of the test, they answered a series of questions assessing characteristics of their thinking activity related to the first task's performance while they were completing the second task.

**Measures and manipulations.**

***Positive and negative affective event manipulation.*** There were three conditions of affective events: positive false feedback (i.e., positive affective event), negative false feedback (i.e., negative affective event), or no feedback (i.e., control group) based on performance associated with the first spatial reasoning test. The six spatial reasoning aptitude questions were taken from the following website, https://www.fibonicci.com/spatial-reasoning/test/, with permission from the owner. The instructions explain that the spatial reasoning test examines orientation skills in two dimensional and three dimensional spaces, which is often used to assess intelligence and basic reasoning abilities. This set of instructions was designed to emphasize the importance of the test to the self (i.e., intelligence and future goals), which characterize affective events (Weiss & Cropanzano, 1996). Similar tests have been used in studies related to stereotype threat (e.g., Steele & Aronson, 1995), threats to self-image (e.g., Fein & Spencer, 1997), and self-serving bias (Campbell & Sedikides, 1999).

After participants completed the spatial reasoning test, they each randomly received one of the three affective event conditions. Participants in the positive affective event condition were informed that they scored at the 93$^{rd}$ percentile ("Great job! You scored better than 93% of the

individuals used in our normative reference sample") and were given an interpretation of their performance ("You scored well above the national standard of ability"). Participants in the negative affective event condition were informed that they scored at the 31st percentile ("We are sorry. You scored worse than 69% of the individuals used in our normative reference sample") and were also given a direct interpretation of their performance ("You scored well below the national standard of ability"). These feedback percentile scores were successfully used and pilot tested in another self-serving bias study (Sedikides, Campbell, Reeder, & Elliot, 1998).

At the end of the survey, participants received a 3-item manipulation check: "How well do you think that you did on this test?", "Was the performance feedback below, same, or above your expectations?", and "How surprised were you by how you performed?" (1 = *not at all well*, 7 = *very well;* 1 = *very much below*, 7 = *very much above*). I also administered state positive and negative affect scales (PANAS) (Watson, Clark, & Tellegen, 1988; See Appendix for measure/scale items) to test if the false performance feedback manipulation elicited appropriate emotions, in order to assess this operationalization of an affective event ($\alpha_{PA}$ = .94 ; $\alpha_{NA}$ = .88).

***Causal attributions.*** Causal attributions for the affective event (i.e., first performance feedback) were collected from those who were in the negative or positive event condition. The measure included the following two items: "To what extent was your performance on the test influenced by factors associated with yourself?" (internal attribution) and "To what extent was your performance on the test influenced by factors associated with the external environment?" (external attribution). Each item was answered on a 7-point Likert scale (1 = *not at all* and 7 = *very much*). This causal attribution measure has been used in past self-serving bias studies (e.g., Duval & Sylvia, 2002).

***Task performance.*** After answering, the causal attribution questions, participants took a similar version of the spatial reasoning task described in the *"positive and negative affective event"* measures section above. The six questions on the second test were different from the first test, but were similar in terms of difficulty and style. Task performance was assessed by counting the number of correct answers given (0 = *0 correct* and 6 = *6 correct*).

***Repetitive thought characteristics of affective event.*** After completing the second test, participants were asked to complete a series of ratings assessing the nature of their thoughts related to the affective event (i.e., false performance feedback) while they were taking the second test. Participants rated on a 7-point bipolar Likert scale the extent to which their non-task related thoughts, while taking the second test "were difficult to control," "were positive," "were around for long periods of time," "occurred frequently," "were helpful," "affected my concentration," and "caused a shift in my perspective about my first test's performance."

All items were taken from Segerstrom et al's study (2002), in which the authors assessed self-rated repetitive thought topics. Based on the current study's theory, I conducted a confirmatory factor analysis (CFA) on 2 dimensions: 1) productive thinking (2 items: positive and helpful; $\alpha$ = .72) and 2) persistent thinking (4 items: were difficult to control, were around for long periods of time, occurred frequently, and affected my concentration; $\alpha$ = .88).Cognitive reappraisal consisted of only 1 item, "caused a shift in my perspective about my first test's performance," and therefore was not included in the CFA. I also conducted a CFA to compare the fit of a two factor model (without the 1 item factor) against the fit of a one factor model, in which all repetitive thinking items loaded onto one latent variable. When the two factor model was tested using listwise deletion to handle missing variables (N = 210), this model exhibited significantly better fit with the data ($\chi^2$ = 15.09, *df* = 8, *p* = .06; RMSEA = .07; CFI = .99; SRMR

= .02) compared to the one factor model ($\chi^2$ = 62.83, *df* = 9, $p < .001$; RMSEA = .17; CFI = .93; SRMR = .09), based on chi-square difference tests ($\Delta X^2(1) = 47.74$, $p < .001$). Finally, the three dimensions were positively and moderately correlated with one another (none exceeded $r = .60$), which suggests that the three dimensions are related, but distinct.

***Controls.*** Age, gender, and Test 1 performance were included as controls. Gender differences in particular have been found in spatial abilities (Voyer, Voyer, & Bryden, 1995). Participants' actual performance in Test 1 was also used as a control to establish a baseline level of spatial ability.

Furthermore, age and gender variables have been found to moderate the self-serving bias effect. Children and older adults displayed the largest biases in a meta-analysis on self-serving bias (Mezulis et al., 2004).

**Analysis.** First of all, owing to the differential effects of positive affective events and negative affective events on causal attributions and repetitive thought characteristics, I analyzed these two conditions separately. More specifically, I tested my hypotheses with two separate models, one with a negative affective event and control condition as the exogenous independent variable and one with a positive affective event and control condition as the exogenous independent variable. Finally, I used Structural Equation Modeling with Mplus 6.12 to analyze both models in their entirety (Muthen & Muthen, 2010). This method of analysis is also appropriate to use in order to test multiple indirect effects, since both models consisted of a dichotomous IV, several mediators, and a DV.

**Results.** Means, standard deviations, and zero-order correlations for all study and control variables are displayed in Table 1. Internal consistency reliabilities for productive thinking ($\alpha$ =

.72) and persistent thinking ($\alpha$ = .88) met the minimum criteria of .70 (Nunnally, 1978). It is noted that, while this information is not necessary to include for experiments, I include them here for transparency purposes.

< Insert Table 1>

***Manipulation checks.*** Participants in the positive event condition reported performing better on the first test ($M_{pos}$ = 3.53, $SD_{pos}$ = 1.78) compared to participants in the control condition ($M_{ctrl}$ = 2.19, $SD_{ctrl}$ = 1.45), $t$(132.629) = 4.905, $p$ < .001 (the assumption of homogeneity of variances was violated for this manipulation check, as assessed by Levene's test for equality of variances ($p$ = .011), and therefore, Welch t-test results are reported). Participants in the positive event condition, compared to those in the control condition, also reported that their results were above their initial expectations ($M_{pos}$ = 5.97, $SD_{pos}$ = 1.35; $M_{ctrl}$ = 3.00, $SD_{ctrl}$ = 1.25; $t$(117) = 12.440, $p$ < .001), they were also more surprised by how they performed ($M_{pos}$ = 5.15, $SD_{pos}$ = 1.68; $M_{ctrl}$ = 2.54, $SD_{ctrl}$ = 1.22; $t$(117) = 9.685, $p$ < .001), and had higher positive affect ($M_{pos}$ = 2.73, $SD_{pos}$ = .85; $M_{ctrl}$ = 2.31, $SD_{ctrl}$ = .82; $t$(138) = 2.951, $p$ = .004). Finally, participants in the positive event condition did not differ significantly in negative affect from those in the control condition ($M_{pos}$ = 1.63, $SD_{pos}$ = .62; $M_{ctrl}$ = 1.60, $SD_{ctrl}$ = .64; $t$(138) = .323, $p$ = .75). Participants in the negative event condition did not significantly differ from participants in the control condition for all five manipulation checks.

***Overall model results.*** Figures 2 and 3 provide the standardized path coefficients for my specified models for positive and negative events, respectively. While, none of the hypotheses for the positive or the negative event models were supported in the Mplus analyses, internal attribution was positively correlated with productive thinking ($r$ = .27, $p$ <.01), and external

attribution was positively related to persistent thinking ($r = .15$, $p < .01$), lending some preliminary support for hypotheses 3b and 4a.

< Insert Figures 2 and 3>

**Discussion of Study 1.** The lack of support for hypotheses 1 through 4 in Study 1 may be due to methodological reasons, namely faulty affective event manipulations. First of all, participants in the positive affective event condition were very surprised by their positive false performance feedback, while participants in the negative affective event condition were not surprised at all by their negative false performance feedback. Furthermore, participants in the negative affective event condition did not significantly differ from those in the control condition in terms of how well they believed they had performed. This suggests that the spatial reasoning exercises may have been too difficult for participants in this study.

Secondly, those in the negative affective event condition did not significantly differ from those in the control condition in terms of negative affect, suggesting these participants may not have been fully invested in how well they performed on the spatial reasoning exercise. Finally, the false performance feedback may have created doubt in participants' perceived ability to judge whether or not their answers were correct on the second spatial reasoning exercise, which may have confounded the effects of self-serving bias and repetitive thinking characteristics on performance.

Finally, the cognitive reappraisal measure may also have contributed to the lack of empirical support for H1-H4 in Study 1. Cognitive appraisal was only assessed by 1 item ("caused a shift in my perspective about my first test's performance"). Therefore, the 1 item

measure used to operationalize cognitive reappraisal may not substantively cover the definitional breadth of this construct.

**Study 2**

**Participants and Procedure.** The purpose of Study 2, in addition to testing the model in Study 1 (H1-H4), was to test the attenuating effect of mindfulness on the positive relationship between the affective event and its associated self-serving attribution. 157 undergraduates from a Pacific Northwest university participated in this study (69 male and 88 female; mean age = 22.83 years, *SD* = 2.24, age range = 20-37). Study 2 was similar to Study 1, except that participants were also randomly assigned to one of two experimental conditions: a mindfulness meditation condition or a mind-wandering control condition (more details in the measures and manipulations section below).

Once again, participants were greeted and escorted to semi-private cubicles by an experimenter who was blind to the hypotheses. After completing the online consent form and answering a few control variable survey questions, participants completed a 15 minute audio mindfulness or mindwandering exercise. Following this exercise, they completed mindfulness manipulation checks and the survey used in Study 1. Recall this survey consisted of a short spatial reasoning exercise followed by false performance feedback, causal attribution questions, another short spatial reasoning exercise, and finally, repetitive thought characteristic questions. This experiment followed a 2 (mindfulness vs. mindwandering) X 3 (positive vs. negative vs. control event condition) factorial design.

**Measures and manipulations.**

***Mindfulness induction.*** Participants listened to a 15-min recorded induction adapted from materials created by Arch and Craske's (2006) and Kabat-Zinn (1990) and provided by Hafenbrack et al. (2014). In the mindfulness meditation condition, participants were led though a focused-breathing meditation exercise that instructed them to repeatedly focus on their experience of breathing (e.g., focus on the physical sensations of breath entering and leaving the body). The mindwandering induction repeatedly instructed participants to think about whatever came into their mind. This type of induction has been used in prior mindfulness experiments (e.g., Hafenbrack et al., 2014; Arch & Craske, 2006; Kiken & Shook, 2011) in order to create a waking, baseline mental state (Mason, Norton, Van Horn, Wegner, Grafton, & Macrae, 2007).

The mindfulness or mindwandering induction was followed by two different mindfulness manipulation checks. The first was used by Hafenbrack and colleagues (2014) and consisted of the following three items (which were averaged, $\alpha$ = .91): "During the audio exercise, I… focused on my breathing," "focused on the physical sensations of breathing," and "focused on the physical sensations of my body" (1 = *strongly disagree*, 7 = *strongly agree*). The second manipulation check was the five-item state measure of the Mindful Attention and Awareness scale (MAAS; Brown & Ryan, 2003). This measure was designed for and is frequently used to measure mindfulness in the general population, particularly for respondents that may lack any kind of mindfulness training or meditation experience. Sample items include: "Today I find it difficult to stay focused on what's happening in the present" (reverse scored), and "Today I find myself doing things without paying attention" (reverse scored). Participants were asked to indicate to what extent these items describe their feelings and behavior "today" (1 = *strongly disagree*, 5 = *strongly agree*; $\alpha$ = .67). See full measure in Appendix.

***Positive and negative affective event manipulation.*** The same event manipulation was used as in Study 1. However, only one manipulation check item was administered: "How well do you think you did on this test?" (1 = *not at all well*, 7 = *extremely well*). In addition, 7 questions were administered in Study 2, as opposed to 6 questions in Study 1.

***Causal attributions.*** The same 2 causal attribution items were used to assess internal and external attributions as were used in Study 1.

***Task performance.*** The same measure of task performance was used as in Study 1. However, 7 questions were administered in Study 2, as opposed to 6 questions in Study 1. For every correct question, I added one point to their performance score (0 = 0 correct, 7 = 7 correct).

***Repetitive thought characteristics of affective event.*** The same measures for productive thinking, persistent thinking, and cognitive reappraisal were used as in Study 1.

***Controls.*** Age, gender, and Test 1 performance were included as controls as were used in Study 1. In addition, I also included meditation experience and trait Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) as controls (see full measures in Appendix). Meditation experience was included as a control, in order to conservatively test the effectiveness of the mindfulness induction. Finally, I controlled for trait PANAS for several reasons: 1) it has been shown to be a significant moderator in terms of one's self-serving bias (Campbell & Sedikides, 1999); 2) to focus specifically on the cognitive effects of interest in my dissertation (i.e., self-serving bias and repetitive thinking characteristics) behind affective event's relationship with performance; and 3) prior research shows that both positive and negative affect are significantly related to mindfulness (Brown & Ryan, 2003; Giluk, 2009).

**Analysis.** The same statistical methods of analysis that were used in Study 1 were used to test the mindfulness intervention effects in Study 2.

**Results.** Means, standard deviations, and zero-order correlations for all study and control variables used in Study 2 are displayed in Table 2. Significant correlations between external attribution and persistent thinking ($r$ = .26, $p$ < .01) lends preliminary support for hypothesis 3b. Once again the three repetitive thinking characteristics, namely productive thinking, persistent thinking, and cognitive reappraisal, are moderately and positively correlated with one another, suggesting that these are related, but distinct, constructs (significant correlations below .50). Internal consistency reliabilities for positive affect ($\alpha$ = .92), negative affect ($\alpha$ = .88), productive thinking ($\alpha$ = .72), and persistent thinking ($\alpha$ = .88) meet the minimum criteria of .70 (Nunnally, 1978). Once again, while not necessary to disclose, I included this additional data for transparency and informational purposes.

< Insert Table 2>

***Manipulation checks.*** Participants in the positive event condition reported performing significantly better on the first test ($M_{pos}$ = 3.48, $SD_{pos}$ = 1.76) compared to participants in the control condition ($M_{ctrl}$ = 2.32, $SD_{ctrl}$ = 1.33), $t$(98.585) = 3.862, $p$ < .001. Likewise, participants in the negative event condition reported performing significantly worse on the first test ($M_{neg}$ = 1.59, $SD_{neg}$ = .88) compared to participants in the control condition ($M_{ctrl}$ = 2.32, $SD_{ctrl}$ = 1.33), $t$(90.109) = 3.339, $p$ = .001. The assumption of homogeneity of variances was violated for both the positive and negative event t-tests, as assessed by Levene's test for equality of variances ($p_{pos}$ = .02, $p_{neg}$ = .01), and therefore, Welch t-test results were reported for these comparisons.

Participants in the mindfulness condition did not report significantly higher levels of focused breathing and physical awareness of the body ($M_{mf}$ = 4.16, $SD_{mf}$ = 1.81), as compared to their mindwandering counterparts in the control condition ($M_{ctrl}$ = 4.09, $SD_{ctrl}$ = 1.56), $t$(148.688) = .264, $p$ = .792. The assumption of homogeneity of variances was violated ($p$ = .04), so Welch t-test results were reported for these comparisons. However, participants in the mindfulness condition did report significantly higher levels of state mindfulness ($M_{mf}$ = 5.07, $SD_{mf}$ = .62), as compared to participants in the mindwandering control condition ($M_{ctrl}$ = 4.79, $SD_{ctrl}$ = .66), $t$(150) = 2.673, $p$ = .008.

***Overall model results.*** Figure 4 provides the standardized path coefficients for the specified positive events model.

< Insert Figure 4>

For this model, hypothesis 4b was partially supported in that persistent thinking was significantly and negatively related to performance ($\gamma$ = -.21, $p$ < .05). In addition, hypothesis 4c was partially supported in that cognitive reappraisal was significantly and positively related to performance ($\gamma$ = .23, $p$ < .05). While the remaining linkages were not significant, several were in the hypothesized direction. For instance, internal attributions made after a positive event was positively related to productive thinking, which was positively related to performance. Internal attributions following a positive event were also negatively related to persistent thinking, though not significantly ($\gamma$ = -.02, $p$ > .05). Finally, while the interaction term between mindfulness and the positive event condition was not significantly related to participants' internal attributions ($\gamma$ = -.15, $p$ = .12), the percentage of variance explained ($\Delta R^2$) by the interaction term in predicting internal attribution was 2.4%. Furthermore, the interaction pattern was as predicted, in that those

in the high mindfulness and high positive event condition had the lowest levels of internal attributions. In other words, mindfulness attenuated their self-serving internal attribution biases following a positive affective event, but not necessarily to the degree expected.

< Insert Figure 6>

Figure 5 provides the standardized path coefficients for the specified negative events model.

< Insert Figure 5>

For this model, hypothesis 3a was partially supported in that productive thinking was significantly and positively related to performance ($\gamma = .24$, $p < .05$). However, while the linkage between self-serving external attributions following a negative affective event was significantly related to productive thinking, the relationship direction was positive ($\gamma = .23$, $p < .05$), as opposed to negative, as was hypothesized. Hypothesis 4b was fully supported, such that external attribution following a negative affective event was significantly and positively related to persistent thinking ($\gamma = .25$, $p < .05$), and persistent thinking was significantly and negatively related to performance ($\gamma = -.23$, $p < .05$). The remaining hypotheses were not supported.

**Discussion of Study 2.** In Study 2, the affective event manipulations for positive and negative affective events were slightly more effective than in Study 1, in that both were significantly different from the control condition in terms of self-reported assessments on how well they performed. However, judging the efficacy of these manipulations remains an open question in that I did not collect other affective event manipulation checks. Therefore, the issues that were raised pertaining to Study 1, namely the difficulty of the spatial reasoning task and the lack of participant investment on how well they performed on this task, could still have impacted

the results in Study 2. These reasons may account for the lack of empirical support regarding the relationships between affective events and self-serving bias.

I did find some preliminary support for Hypotheses 3b and 4b, such that persistent thinking following affective events mediated the relationship between self-serving bias and performance in the hypothesized directions for both types of affective events. However, external attributions that were made following a negative event were significantly and positively related to productive thinking, which was unexpected. This unexpected result may be due to the fact that the negative affective event manipulation was weak, and therefore, participants were able to quickly recover from and productively rationalize away their negative performance in order to focus on their subsequent task.

Finally, I also found mixed results for the relationship between cognitive reappraisal and performance, and for the attenuating effect of mindfulness on self-serving bias. Once again, the mixed results concerning cognitive reappraisal may be due to the fact that this construct was only measured by 1 item. The mixed mindfulness results may be due to the fact that the mindfulness induction in the lab was not very strong as only one manipulation check was significant, and the effect size for this significant manipulation check was small.

**Study 3**

In Study 3, I used an experience sampling methodology with a pre-tested mindfulness intervention, along with comparative business best-practices control condition to field test my theoretical models and related hypotheses. Participants were randomly assigned into either: 1) a control group (CG), where participants watched brief business best practices videos, or 2) a mindfulness intervention group (MIG), where participants received a mindfulness self-training

intervention (e.g., Hulsheger et al., 2013) and practiced brief mindfulness meditations at the start and end of each day (more details on the intervention and control conditions are provided in the Measures and interventions section below).

I also collected measures of participants' current state mindfulness, affective events experiences, causal attributions, repetitive thinking characteristics regarding a recent affective event, and self-reported ratings of objective performance measures at two different daily time points over the course of five work days. An experience sampling design with two points of measurement each day has been used in prior studies in order to provide an immediate and accurate record of events and associated variables, to minimize retrospection bias, and to provide enough time to be representative of a participant's typical work week (e.g., Bledow, Schmitt, Frese, & Kühnel, 2011; Reis & Wheeler, 1991; Hulsheger et al., 2013). This study design allowed for the assessment of whether MIG participants experienced less self-serving bias, less repetitive thinking (or more productive thinking in resolving the event) and higher performance in the face of affective events compared to CG participants.

**Participants and Procedure.** The participants were recruited for this study from Qualtrics and Amazon's Mechanical Turk (MTurk), and had to meet the following four criteria for inclusion:1) worked full time during normal business hours (e.g., 9 am to 5 pm); 2) spent at least 50% of each work day (on average) interacting with customers or clients; 3) were able to provide self-reported objective measures of performance twice per day (midday and end of day), namely tips, calls made to customers/clients in person or over the phone, amount of sales made, and/or number of customers helped, and 4) willingness to provide an email address to participate in the five day longitudinal study.

Participants who met these four criteria were automatically directed to take an introductory survey which consisted of the longitudinal study's consent form and the same control variables used in Study 2, namely trait positive and negative affect, average daily levels of performance (participants could choose which objective performance measures to report), and demographic variables, such as gender, age, average number of hours worked each day, and meditation experience (see Appendix for measures).

410 participants who met the criteria above were first recruited on Qualtrics. Nineteen of the 410 emails were faulty. Therefore, the remaining 391 participants were randomly assigned to either the MIG or the CG. Those in the MIG, received the modified introductory mindfulness training documents, initially created by Hulsheger and colleagues (2013) (see Appendix for details), the weekend before the five day longitudinal study began, MIG participants were instructed to read the document before the study began on Monday morning. Starting on Monday morning, participants received two exercises and two surveys each day via email: 1) a 5-8 minute morning exercise to be taken before work; 2) a 5 minute midday survey to be taken in the middle of the work day (e.g., noon); 3) a 5 minute end-of-day survey to be taken at the end of the work day (e.g., 5 pm); and 4) a 5-8 minute evening exercise to be taken before going to bed.

Midday and end-of-day surveys were identical for all participants and consisted of state mindfulness, event intensity, causal attributions, repetitive thought characteristics related to the event, and daily performance measures. Exercises for each condition were different: the MIG exercises consisted of audio meditation exercises, and the CG exercises consisted primarily of TED talk videos (more details provided in the Measures and Interventions section below). Participants who fully completed five days of exercises and surveys received a $25 Amazon gift certificate or $25 payment via PayPal as compensation. Those who completed 4 full days

received $15. At the end of the first week of data collection, 27 participants completed at least four days of the survey (6.9% response rate).

Due to the low response rate using the Qualtrics panel participants, I then recruited participants using MTurk over the following two weeks. Out of 107 participants who signed up for the study and met all of the study's requirements, 70 participants completed at least four full days of the five day longitudinal study, resulting in a 65% response rate. This response rate is typical of the average response rate (52.3%) reported in a recent meta-analysis on response rates in organizational survey research (Anseel, Lievens, Scholleart, & Choragwicka, 2010). While a total of 97 participants completed at least 4 days of the study, I included all viable responses in the final merged dataset for all three waves of data collection to maximize the sample size. This final merged dataset consisted of 1096 half day level responses and 149 participants (63 in the CG condition and 86 in the MIG condition; 66 male and 83 female; mean age = 37.04 years, *SD* = 10.06, age range = 19-65). .

**Measures and Interventions.**

***Mindfulness intervention group (MIG).*** The MIG received mindfulness meditation instructions and materials based on two widely used and closely linked mindfulness programs, mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002) and mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982). While MBCT and MBSR are typically deployed over 8 weeks and involve regular group-training sessions with a mindfulness expert, this shortened (5 working days), self-training approach has been used successfully in a previous study (Hulsheger et al., 2013).

The mindfulness self-training intervention consisted of guided mindfulness meditation, which aimed to cultivate an accepting, nonjudgmental attitude towards one's present experience. For instance, during guided meditation sessions, participants learned to be nonjudgmentally aware of thoughts and feelings that arise each moment, treating them as just thoughts or just feelings. Participants also learned what it means to 'be present' by repeatedly returning attention to an object (e.g., their breath). The 5-8 minute guided mindfulness meditation sessions consisted of brief meditations, such as the BodyScan and the Three-Minute Breathing Space (see Hulsheger et al., 2013 for detailed descriptions). MIG participants meditated for at least 10 minutes each day and were encouraged to meditate longer if they so wished. The Appendix contains the mindfulness self-training intervention document that each MIG participant received the weekend before the 5-day study began and a chart listing the various meditation exercises administered each morning and evening.

***Control Group (CG).*** As opposed to daily meditation practices, the CG participants received twice daily 5-8 minute research-based business best practice videos (e.g., TED talks). For instance, on Monday morning, CG participants were asked to watch a 6 minute TED talk video on Amy Cuddy's research on self-empowerment through body language. Then, CG participants were asked to power pose for 2 minutes. Each video was followed by a short question to verify that they had watched the video. Please refer to the Appendix section to see the business best practices videos participants were asked to watch each day.

***State mindfulness.*** Participants answered the five-item state measure of the Mindful Attention and Awareness scale (MAAS; Brown & Ryan, 2003) as was described in Study 1, as a manipulation check for the mindfulness intervention (see the full measure in the Appendix).

***Positive and negative affective event.*** I assessed significant events via a combination of a

few items and one open-ended question. First, I described affective events (labeled "significant work event") to participants as the following, "A significant work event is a *specific* work-related event that has triggered a memorable positive (e.g., proud, happy, content, optimistic, enthusiastic, etc.), or a negative (e.g., depressed, angry, frustrated, disappointed, worried, etc.) emotional reaction from you. For example, positive events are often work goal-enhancing (e.g., praise from a customer, peer, or supervisor), while negative events are often disruptive to work goals (e.g., dealing with a difficult customer or client, losing a sale, not receiving an expected tip amount, not feeling heard or appreciated during a work meeting, etc). Please think of and report on the *most recent* significant work event you have encountered AND are still experiencing its emotional effects." Similar descriptions have been used in prior research (Zohar e al., 2003; Matta et al., 2014).

Following this description, I asked participants: 1) have you experienced a significant positive or negative event recently (where you are still experiencing its emotional effects)? (yes/no), 2) when did this event occur?, 3) please describe in a few words what this most recent significant work event was about (e.g., dealing with difficult customer), 4) they then evaluated the positive and negative work event level of intensity (2 items, 1 = *did not encounter recently*, 7 = *very intense*); and as a manipulation check, 5) provided a current rating of positive (e.g., proud, happy, optimistic, content, enthusiastic, excited, etc.) and negative emotions (e.g., depressed, angry, unhappy, frustrated, disappointed, worried, etc.) (2 items, 1 = *not at all*, 7 = *very strongly*).

Participants who had answered "yes" to the first question and were currently experiencing an affective work event, had their answers from question 3 (describe the event in a few words) piped into the causal attribution and repetitive thought characteristic questions. If

participants answered “no” to the first question and were not currently experiencing an affective work event, they had the option of answering “N/A” or “did not encounter recently” for the remaining event questions. These “no event” participants were then directed to answer slightly modified versions of causal attribution and repetitive thought characteristic questions (see the measures below for further details).

***Causal attributions.*** Causal attribution of the affective event was assessed with the following two items (Duval & Sylvia, 2002): 1) “To what extent was the significant event caused by factors associated with yourself (e.g., skill, abilities, effort, etc.)?” and 2) “To what extent was the significant event caused by factors associated with the external environment (e.g., another person, situation, luck, etc.)?” (1 = *not at all* and 7 = *very much*).

Causal attributions of a non-event was assessed with the following two modified items: 1) “To what extent has the progress of your day so far been caused by factors associated with yourself (e.g., skill, abilities, effort, etc.)?” and 2) “To what extent has the progress of your day so far been caused by factors associated with the external environment (e.g., another person, situation, luck, etc.)?”

***Repetitive thoughts of affective event.*** As in Study 1, participants were asked to complete a series of ratings assessing the nature of their thoughts (Segerstrom et al., 2003) related to the affective event they reported earlier that day. However, I used a shortened version of the scale in order to minimize the length of the survey. Productive thinking was captured by “my thoughts related to the significant work event, *<piped in event description>*, were positive.” Persistent thinking was captured by “…were difficult to control,” “…were around for long periods of time,” and “…occurred frequently.” Cognitive reappraisal was captured by “…caused a shift in

my perspective about the event." I chose these items, because they were the highest loading items for each factor in previous studies.

Repetitive thought characteristics of a non-event were be assessed with the same items; however, non-event participants were instructed to recall any *non-work* related thoughts they had over the past 4 hours, and then were asked to rate the extent to which these thoughts had the following characteristics. Their item stem was "This morning/afternoon, my non-work related thoughts….".

***Individual task performance.*** Individual task performance was captured twice a day. Participants could choose which performance metric(s) they would like to report from the following options: tips ($), number of calls made (phone), number of calls made (in person), amount of sales made ($), and number of customers you helped. They were instructed to record their performance for half of the day (morning or afternoon depending on if they were taking the mid-day or end-of-day survey, respectively). They were also instructed to record the same type of performance each day for the duration of the study.

At the end, the sample breakdown was 147 tips, 378 number of phone calls made, 196 number of in-person calls made, 335 performance sales, and 659 was the number of customers helped. I then divided each performance type by half of the same performance type's daily average to create a performance ratio to use to compare between participants. For instance, I took the number of tips recorded that half day divided by one-half of that participant's average daily tips amount. Finally, I used $\log_{10}$ to apply logarithmic transformations on all of these performance ratios due to the fact that every performance measure was positively skewed. However, even after logarithmically transforming all performance ratio measures, only the tips

ratio performance measure approached a normal distribution with a skewness of -.406 (*SD* = .314) and a kurtosis of .761 (*SD* = .618). Furthermore, I also ran an exploratory factor analysis on the five performance measures to see if items could be combined. Results demonstrated that number of phone calls, in-person calls, and customers being helped fell onto one factor and sales performance and tips fell onto another factor. However, after combining these factors and transforming them, their distributions failed normality tests. Therefore, I used the logarithmic transformation of the tips ratio as the performance measure, in spite of its smaller sample size.

***Controls.*** I included the same controls in the introductory survey (survey taken before the five day longitudinal intervention study began) as in Study 2, namely gender, age, meditation experience, and Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). I also included average number of daily work hours as a control for daily performance.

**Analysis.** Once again, owing to the differential effects of positive affective events and negative affective events on causal attributions and repetitive thought characteristics, I analyzed these two conditions separately. Both models were first stage multilevel moderated mediation models, where the moderator (mindfulness condition) was a level 2 variable (person level) and the remaining variables were at level 1 (half day level). Therefore, I used multilevel Structural Equation Modeling with Mplus 6.12 to analyze both models in their entirety (Muthen & Muthen, 2010).

Multilevel moderated mediation analyses were completed following Preacher and colleagues' recommendations (Preacher, Zhang, & Zyphur, 2011; Preacher, Zyphur, & Zhang, 2010). Unlike traditional multilevel models that combine within- and between-person effects in one slope, the primary advantage of this approach is that it separates the variance of Level 1

variables (day level) into within and between components, and thereby, accounts for differences between between-person and within-person relationships.

**Results.** Means, standard deviations, and zero-order correlations for all study and control variables used in Study 3 are displayed in Table 3. Significant correlations between positive events and internal attributions ($r$ = .69, $p$ < .01); and internal attributions and productive ($r$ = .63, $p$ < .01) and persistent thinking characteristics ($r$ = .31, $p$ < .01) provides preliminary support for hypotheses 1a, 4a, and 4b. Similarly, significant correlations between negative events and external attributions ($r$ = .35, $p$ <.01), and internal attributions and productive ($r$ = -.21, $p$ < .01), as well as persistent thinking characteristics ($r$ = .14, $p$ < .05) provides preliminary support for positive event model hypotheses 1b, 3a, and 3b. Internal consistentcy reliabilities for positive affect ($\alpha$ = .93), negative affect ($\alpha$ = .96), and persistent thinking ($\alpha$ = .80) meet the minimum criteria of .70 (Nunnally, 1978).

< Insert Table 3>

***Intervention checks.*** I tested for comparability of samples in the intervention and control group in age ($M_{mf}$ = 35.50, $SD_{mf}$ = 9.67) ($M_{ctrl}$ = 39.14, $SD_{ctrl}$ = 10.28), $t$(147) = -2.21, $p$ = .03 and gender ($M_{mf}$ = .51, $SD_{mf}$ = .50) ($M_{ctrl}$ = .62, $SD_{ctrl}$ = .49), $t$(135.73) = -1.31, $p$ = .19. Participants in the mindfulness intervention group did not report significantly higher levels of state mindfulness ($M_{mf}$ = 4.94, $SD_{mf}$ = 1.50) than participants in the control group ($M_{ctrl}$ = 4.89, $SD_{ctrl}$ = 1.60), $t$(1094) = 2.673, $p$ = .59. A linear regression established that positive events were positively related to positive emotions ($B$ = .44, $p$ <.001), and negative events were positively related to negative emotions ($B$ = .65, $p$ <.001).

***Overall model results.*** Figure 7 provides the standardized path coefficients for the specified positive events model.

< Insert Figure 7>

For this model, testing hypothesis 1a, I found that a positive event occurring at work was positively related to internal attributions, was supported ($\gamma = .27$, $p < .001$). Hypothesis 4a was supported in that participant's internal attribution following a positive event was positively related to productive thinking ($\gamma = .30$, $p < .001$), and productive thinking was related to performance ($\gamma = .12$, $p < .05$). However, hypotheses 4b and 4c were not supported. Participants' internal attribution was significantly related to persistent thinking ($\gamma = .12$, $p < .05$) and cognitive reappraisal ($\gamma = .11$, $p < .05$); however, these relationships were in the opposite direction of what was originally hypothesized.

Finally, hypotheses 5a and 5c were partially supported. While the interaction term between mindfulness and experiencing a positive event was not significantly related to participants' internal attribution ($\gamma = -.08$, $p = .12$), the interaction was in the hypothesized direction, in that those in the high mindfulness and high positive event group had lower levels of (internal) attribution bias than those in the low mindfulness and high positive event group. In other words, the mindfulness intervention helped to attenuate self-serving internal attribution biases following a positive affective event.

< Insert Figure 9>

Figure 8 provides the standardized path coefficients for the specified negative events model.

< Insert Figure 8>

For this model, I found that the experienced negative event was positively related to participants' external attribution, fully supporting hypothesis 1b ($\gamma = .37$, $p < .001$). Hypothesis 3a was partially supported, since only productive thinking was positively and significantly related to performance ($\gamma = .11$, $p < .05$). Hypotheses 3b was partially supported in that internal attribution was positively related to persistent thinking ($\gamma = .17$, $p < .005$), but the relationship between persistent thinking was negative, but insignificant ($\gamma = -.05$, $p > .05$). However, Hypotheses 4c was not supported in that while participants' external attribution was significantly related to cognitive reappraisal ($\gamma = .17$, $p = .005$), it was in the opposite direction of what was hypothesized.

Finally, hypotheses 5b and 5d were partially supported in that the interaction term between mindfulness and participants experiencing a negative event produced a marginally significant relationship with participants' external attribution ($\gamma = -.08$, $p = .06$). Furthermore, the interaction pattern was in the hypothesized direction, in that those in the high mindfulness and high negative event group had lower levels of (external) attribution bias than those in the low mindfulness and high negative event group. In other words, the mindfulness intervention helped to attenuate self-serving external attribution biases following a negative affective event.

< Insert Figure 10>

**Discussion of Study 3. H**ypotheses 1a and 1b produced significant results, such that participants who experienced a positive affective event subsequently made internal attributions, while participants who experienced a negative affective event subsequently made external attributions. The effect sizes for both relationships were large and significant. These strong

results shed some light on why these relationships were insignificant in Studies 1 and 2 – authentic experiences of affective events seem to be difficult to recreate in the lab.

Secondly, hypotheses 2a and 2b were not supported. In other words, self-serving bias was not significantly related to performance. This may be due to the fact that performance is still quite distal from causal attributions, as evidenced by the differing positive and negative relationships between causal attributions, the repetitive thought characteristic mediators, and performance. It is also possible that there are problems with the performance measure in terms of how tips were calculated and/or whether the week during which this study was conducted was representative of a typical week for these employees.

Thirdly, hypotheses 3a, 3b, 4a, and 4b were generally supported, such that productive thinking and persistent thinking mediated the relationship between self-serving bias and performance in the expected direction for most of these hypotheses. However, while not significant, external attributions that were made following negative affective event experiences were positively related to productive thinking (H3a), as in Study 2. Once again, this may be due to the fact that the average negative affective events experienced day to day were not very intense. Therefore, following low intensity negative events, participants were more inclined to form productive thoughts resolving the event or thoughts with a *solving minded* purpose, defined as "trying to narrow down, to make sure, to make plans or to declare knowledge", rather than a *searching minded* purpose, defined as "exploring, considering possibilities, or expressing confusion" (Segerstrom et al., 2003, p. 916). Hypotheses 3c and 4c were not supported and may be due to the fact that cognitive appraisal was measured with 1 item.

Finally, Study 3 results provided some preliminary evidence in support of hypotheses 5a-d, since the attenuation effect of mindfulness on self-serving bias was marginally significant for both positive and negative affective events. These results may be due in part to the self-training aspect of the mindfulness intervention, which will be discussed further in the General Discussion section.

## GENERAL DISCUSSION

This proposed research contributed to the management literature in two main theoretical domains: mindfulness and affective events theory. Below I discuss how this research contributes both theoretically and empirically to these two areas, and in particular, their relationship with automatic cognitions to affect downstream task performance.

### Mindfulness

As mentioned in the introduction, mindfulness research has primarily focused on its positive main effect on performance (e.g., Glomb et al, 2011; Dane & Brummel, 2013; Reb et al, 2012). Therefore, with this study, I tested boundary conditions of this relationship by seeing if: a) mindfulness attenuates self-serving attribution biases following affective events, and consequently, b) attenuates self-serving bias's positive and negative effects on task performance via repetitive thinking mechanisms for positive affective events and negative affective events, respectively.

First, in Studies 2 and 3 where I examined mindfulness's impact on the relationship between affective event and self-serving attributions, results suggest that mindfulness attenuates self-serving bias for both negative and positive events. While these results were not significant, perhaps due to the difficulty of creating a mindfulness mindset amongst participants with limited

mindfulness meditation experience in such a short period of time (see limitations section), they explained enough change in variance, and were consistently in the same negative direction. This suggests that invoking higher levels of mindfulness could potentially attenuate self-serving attributions. Furthermore, in both the lab and field studies, I induced state mindfulness, which is a more conservative method of testing the effects of mindfulness, as opposed to using trait measures of mindfulness. I therefore conclude that there was partial support for hypotheses 5a and 5b, and that more work needs to be done to replicate these findings. Further, this finding is a contribution to the literature on mindfulness and decision-making, particularly by reinforcing its propensity to reduce cognitive biases (e.g., sunk cost bias (Hafenbrack et al., 2014), negativity bias (Kiken & Shook, 2011), etc.).

In terms of the attenuating role of mindfulness's on affective events' downstream effects on self-ratings of objective task performance, experiencing negative events at work for participants was strongly related to self-serving bias (external attributions) ($\gamma = .37$, $p < .001$), external attributions following negative events were also positively related to persistent thinking ($\gamma = .17$, $p < .005$); and persistent thinking was negatively related to self-ratings of objective performance ($\gamma = -.05$, $p > .05$). While the relationship between persistent thinking and performance was not significant in the longitudinal field study, this relationship was strongly negative in Study 2 for both positive ($\gamma = -.21$, $p < .05$) and negative ($\gamma = -.23$, $p < .05$) events. This preliminary evidence indicates that mindfulness's attenuation of self-serving bias may be beneficial to task performance when individuals are experiencing negative events at work. Overall, I conclude that there is some evidence to support hypotheses 1b, 3b, and 5d.

In Study 3, positive events were strongly related to self-serving bias (internal attributions) ($\gamma = .27$, $p < .001$), internal attributions following positive events were positively related to

productive thinking ($\gamma = .30$, $p < .001$), and productive thinking was positively related to performance ($\gamma = .12$, $p < .05$). In this same study, internal attributions following the experience of positive events at work were also positively related to persistent thinking ($\gamma = .12$, $p < .05$). However, this effect was much smaller than the relationship between internal attribution and productive thinking ($\gamma = .30$, $p < .001$). Therefore, mindfulness's attenuation of self-serving bias suggests that it may also attenuate the positive chain of events that can occur between positive events and task performance. Overall, I found some evidence to support hypotheses 1a, 4a, 4b, and 5c.

With this proposed study, I also aimed to better understand if using mindfulness techniques are indeed capable of facilitating cognitive reappraisals of affective events. Cognitive appraisals can be especially powerful, particularly for negative events, since they can potentially reduce the frequency and intensity of future negative affective event experiences. In the set of three studies, I found that the relationship between cognitive reappraisal and performance was inconclusive due to conflicting and/or non-significant effects across the three studies. Therefore, hypotheses 3c and 4c were not supported.

Finally, there were three main effects found in the results from Study 3 that were inconsistent with hypotheses: 1) the positive relationship between participants' internal attributions following positive events and persistent thinking; 2) the positive relationship between participants' external attributions following negative events and productive thinking; and 3) the positive relationship between both participants' external and internal attributions and cognitive appraisals. For the first two main effects listed above, the intensity of the affective event may be the reason behind these counter-intuitive results. As noted earlier, positive repetitive thinking occurs in the form of basking, anticipating, reminiscing, savoring,

daydreaming, etc. (e.g., Bryant, 1989; Singer, 1975; Taylor & Armor, 1996; Wyer, 1996), as well as positive rumination, defined as rumination with positive valence thought content (Martin & Tesser, 1996; Watkins, 2008). In addition, experimental evidence has shown that negative thoughts are not inherently less controllable than positive thoughts, but rather, it is the emotional intensity of either valence that minimizes controllability (Clark, 1986; England & Dickerson, 1988). In other words, it may be both the intensity of participants' affective event experiences, rather than the valence of these affective event experiences, that triggers productive and/or persistent thinking. . Furthermore, repetitive persistent thinking may ultimately result in cognitive reappraisals of the situation, regardless of the valence of the event. This may be particularly true if cognitive reappraisals are operationalized as thoughts related to the affective event "causing a shift in one's perspective about the event", as I have done in this research. In the future, a more thorough operationalization of cognitive appraisal should be used.

In sum, these results lend support to the proposition that affective events are a boundary condition for mindfulness's relationship with intra-individual task performance in that it appears to be beneficial to performance during negative events and detrimental to performance during positive events. Consequently, simply experiencing a negative or positive event is not necessarily as impactful to performance as opposed to how much attention, thought, and types of thinking one applies to the event, perhaps largely determined by the intensity of the affective event.

**Affective Events**

In addition, this study also contributes to the management literature in terms of its focus on the cognitive mechanisms through which affective events affect individual performance. As summarized earlier in the introduction, there have been few, if any, studies that have examined

the relationship between both positive and negative affective events on performance, and to my knowledge, no studies have explored the specific cognitive mechanisms through which this occurs.

Based on this gap in the literature, I hypothesized that self-serving bias should be a strong factor in helping scholars understand the complex relationship between affective work event experiences and performance. Additionally, there have been very few prior field studies that have examined the relationship between self-serving bias and intra-individual performance in the micro OB or management literature. Whereas, in the strategy literature, there have been several studies which demonstrated that executives tend to take credit for positive outcomes and lay blame on the environment for negative outcomes (e.g., Salancik & Meindl, 1984; Staw, McKechnie, & Puffer, 1983; Clapham & Schwenk, 1991). However, there seems to be mixed results in this literature regarding whether or not this self-serving bias positively (Salancik & Meindl, 1984; Staw et al., 1983) or negatively affects performance (Clapham & Schwenk, 1991). In this research, the authors typically code annual reports in operationalizing self-serving bias and then look for connections with organizational measures of performance (e.g., earnings per share). The current study was focused more on examining the linkages between micro-cognitive mechanisms following affective events and their impact on self-reported, objective measures of performance (e.g., tips made at the end of the day).

In the OB literature, there have also been very few field studies that have examined the relationship between self-serving bias and subsequent intra-individual performance, or performance in general. However, there are a few studies which suggest that self-serving bias has mixed effects on an individual's decision-making process and outcomes. For instance, in an experimental and field study, Audia and Brion (2007) reported that decision makers gave greater

importance to a secondary performance indicator (when a primary performance measure was low), only when it helped them maintain a sense of positive performance. This, in turn, resulted in a reluctance to change course. Larwood & Whittaker (1977) reported that in both management student and executive samples, self-serving bias led to overly optimistic planning decisions. In an experimental study, Goncalo & Duguid (2008) reported that individually focused attributions for past successes improved the quality of group decision making. Thus, there appears to be sufficient evidence to warrant further research into how affective events are perceived, processed and then subsequently interpreted based on an individual's level of mindfulness, and the impact these processes have on decision-making and performance.

In sum, not only has management research on self-serving bias's effect on individual performance been extremely limited, the subsequent findings from this research have also been mixed. Likewise, in this research, I found that self-serving bias was not directly related to performance in all three studies for both positive and negative events. Therefore, hypotheses 2a and 2b were not supported. However, as described earlier, there are significant serial mediation effects linking affective events with intra-individual task performance. For instance, in Study 3, I found strong evidence that positive affective events trigger self-serving attributional biases, which in turn, positively affected productive thinking and self-reported objective performance. Alternatively, when participants reported experiencing negative events, their external attributions regarding those events seemed to positively affect their level of persistent thinking, which then negatively influenced their task performance at work. Therefore, the proposed experimental and field study on the effects of affective events on inter- and intra-individual performance, respectively, through self-serving bias and repetitive thinking characteristics, do shed some light on how mindfulness may influence participant's reactions to a broad range of affective events.

In conclusion, by better understanding whether or not self-serving biases are beneficial to decision making and performance for both negative and positive events, one can also better understand the benefits and limitations of maintaining a positive sense of self. Moreover, based on these preliminary results, it appears that even relatively short mindfulness interventions can have an effect on how participants process events and continue to remain motivated to perform.

**Limitations**

This proposed research is not without limitations. There are several inherent limitations in the experiment and field designs to note. First of all, due to the opposing hypotheses between both positive and negative affective events on performance and the mediating variables, I had to analyze positive and negative affective events separately by comparing each with a control condition. Second, it was difficult to determine whether or not the particular week I ran the study was typical for participants in terms of affective events experienced. Third, my samples consisted primarily of either undergraduate students or lower level employees in a wide variety of customer service work. It would be interesting to explore how senior leaders and managers would react to the mindfulness intervention and how this might affect their performance.

Another limitation was that the self-training mindfulness intervention I used may not have been long enough or strong enough to elicit an authentically mindful state of mind from my participants. The individuals who participated in these studies came from a general population with limited mindfulness or meditation experience. I also reanalyzed the field study using only participants who completed at minimum, 4 days of mindfulness exercises, to see if the effects of training were stronger. However, these results did not differ significantly from the original results. Finally, my ability to determine whether participants actually meditated every day was

quite limited. There is a fine balance between creating an effective self-training mindfulness intervention, retaining participants, and validating their level of participation. Therefore, due to these limiting factors, it can be difficult to truly understand the strength of mindfulness's effects on performance, self-serving bias, and repetitive thinking characteristics.

I also ran into limitations discovered after running the experiment and field studies. In both experiments (Studies 1 and 2), the spatial reasoning task used to elicit self-serving attribution biases was discovered to be too difficult and not important to the individual. For instance, when participants received false positive performance feedback, they were very surprised, causing them to more likely attribute their performance to external factors ($r_{Study1}$ = .20, $p$ <.05). Likewise, when participants received false negative performance feedback, they were not surprised and less likely to attribute the performance to external factors. Furthermore, due to the fact that no significant positive or negative affect were elicited from the false performance feedback, I inferred that participants did not care very much about the task or how they performed. Therefore, the experience sampling methodology used in the field study was a better method for capturing real affective events and testing their relationship with self-serving attributions and subsequent downstream mechanisms.

Another limitation involved the performance measure used in the field study. In order to maximize the number of participants who could qualify to take the study, I used as broad a range of objective performance measures they were allowed to report, specifically the number of customers they interacted with, the number phone calls made, the number of in-person calls made, sales performance, and tips. First of all, all performance measures were very positively skewed, except for the logarithmic transformation of tips ratio, which had a significantly smaller sample size (see Study 3 methods section for details). Secondly, it was difficult to create an

aggregated performance measure that could be used to compare between participants that was also psychometrically valid (i.e., normal in distribution with high internal consistency reliability). Finally, objective performance measures were self-report and vulnerable to inaccurate recall and inflation.

Finally, the measures for the repetitive thinking characteristics may not have operationalized each dimension fully. For instance, due to the factor structure of the items, cognitive reappraisals were only captured by one item "caused a shift in my perspective." Perhaps finding measures that represent each construct more fully and/or adding additional items to each dimension may be worthwhile in future efforts.

**Future Directions**

In addition to addressing these limitation issues, I also captured other variables in all three studies that are related to mindfulness and affective events, which can be analyzed in future studies. For instance, I also measured state self-esteem, task engagement, detachment from the event, rumination, and positive and negative thinking. Furthermore, the field study data lends itself to testing various latent growth models, such as seeing whether or not the mindfulness intervention affects states of mindfulness, performance, repetitive thinking, etc. over time. Finally, exploring possible curvilinear effects of the intensity of affective events on repetitive thinking characteristics and performance may be worthwhile. In sum, there are many more related models to test from the current data collection that could potentially strengthen the findings of this study.

Additionally, future research in this area may consider using experienced mindfulness practitioners as samples, or using a more robust mindfulness intervention by also relying on peer

support, leader support, or even technological support, such as a meditation minutes tracker/reminder, when testing mindfulness's effect on self-serving (or related self-enhancing) biases, repetitive thinking characteristics, and performance. Furthermore, by attenuating self-serving bias, mindfulness can also potentially have beneficial effects on work relationships (e.g., leader-member exchange, team relationship conflict, etc.), which has yet to be explored. For instance, using peer ratings of mindfulness to see how mindfulness perceptions affect work relationships.

Third, studying the effects of mindfulness on a wide range of decision-making biases can be a fruitful research and practical endeavor. For instance, researchers may be interested in exploring mindfulness's effect on mood-as-information bias (Schwarz & Clore, 2003), where people often times mistake a mood as an accurate source of information for how they feel about their current situation. Similar to self-serving bias, this faulty attribution can have serious implications for attitudes, judgments, decision-making, and relationships in organizations. Additionally, mindfulness is also theoretically ideal in attenuating this bias, since mindfulness can help one attribute the causes of emotions or moods to internal thought content (over which one has control), as opposed to external factors.

Finally, exploring other boundary conditions on the positive effects of mindfulness would be meaningful. For instance, motivation is another interesting area for research where mindfulness can have either positive or negative effects, particularly if those who are mindful are less susceptible to extrinsic motivational levers. In addition, exploring extreme work-related and non-work-related affective events to determine if there are thresholds to mindfulness's effectiveness may be worthwhile. In conclusion, in spite of its limitations, the proposed studies

can have meaningful implications for management, personal goals and well-being, and future research.

**Practical Implications**

Finally, the primary purpose of this study was to apply a scientific lens in examining *how* mindfulness reduces suffering, one of its primary functions in Buddhist psychology (Nārada, 1979). Specifically, in my research, I found preliminary empirical support that mindfulness meditation reduces the strong psychological, often times, unconscious need to maintain a positive sense of self, or ego, as evidenced by its attenuation of self-serving bias. My study also sheds some light on the implications of how reduction of one's ego investment in a particular task, role, and/or job (i.e., self-serving bias) can affect the way individuals perform inside and outside of the work environment. For instance, a higher degree of mindfulness seems to be beneficial to an individual's daily task performance during a negative event experience and possibly detrimental to task performance during positive event experiences as well. Therefore, after experiencing a negative event (e.g., being yelled at by a customer), managers may want to encourage employees to meditate to reduce repetitive, unproductive thinking during work.

In conclusion, this study provides initial empirical evidence regarding how an individual's view of themselves, typically referred to in the mindfulness literature as one's ego, can impact how the individual responds to varying positive and negative events, and consequently, how their response can impact task performance and ultimately well-being through the minimization of negative repetitive thinking. As is true of most new areas of research, much more needs to be discovered before we can provide specific guidelines for mindfulness

interventions that can definitively improve the affective state of employees, and consequently, their well-being and performance.

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Table 1

*Means, Standard Deviations, and Intercorrelations Among Study Variables for Study 1*

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Sex ("0" male; "1" female) | 0.49 | 0.50 | -- | | | | | | | | | |
| 2. Age | 22.66 | 3.45 | -.06 | -- | | | | | | | | |
| 3. Test 1 performance | 3.15 | 1.37 | -.08 | .14* | -- | | | | | | | |
| 4. Positive event[a] | 0.50 | 0.50 | -.02 | .07 | .11 | -- | | | | | | |
| 5. Negative event[b] | 0.50 | 0.50 | .11 | .16 | .09 | -- | -- | | | | | |
| 6. Internal attribution | 4.41 | 1.52 | .00 | .04 | .07 | .05 | -.13 | -- | | | | |
| 7. External attribution | 2.80 | 1.59 | -.01 | -.01 | .08 | .20* | .09 | .00 | -- | | | |
| 8. Productive thinking | 2.40 | 1.32 | -.17* | .05 | -.01 | .27** | -.10 | .17* | .10 | **.72** | | |
| 9. Persistent thinking | 2.40 | 1.37 | .03 | -.05 | .05 | .15† | .07 | .05 | .15* | .30** | **.88** | |
| 10. Cognitive reappraisal | 2.64 | 1.64 | -.07 | -.01 | .34** | .10 | -.02 | .03 | .11 | .46** | .60** | -- |
| 11. Test 2 performance | 2.71 | 1.34 | .06 | .11 | .34** | .03 | .21* | .01 | -.11 | -.07 | -.03 | -.11 |

*Note.* N = 210 undergraduate students. Internal consistency reliabilities are shown on the diagonal in bold.

[a] Positive event ("0" control group; "1" positive event group who received false positive/success performance feedback for Test 1).

[b] Negative event ("0" control group; "1" negative event group who received false negative/failure performance feedback for Test 1).

*$p < .05$. **$p < .01$.

Table 2

*Means, Standard Deviations, and Intercorrelations Among Study Variables for Study 2*

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Sex ("0" male; "1" female) | 0.56 | 0.50 | -- | | | | | | | | | | | | | |
| 2. Age | 22.83 | 2.24 | -.11 | -- | | | | | | | | | | | | |
| 3. Meditate | 1.39 | 0.71 | .10 | -.01 | -- | | | | | | | | | | | |
| 4. Positive affect | 3.27 | 0.74 | -.10 | .03 | -.01 | **.92** | | | | | | | | | | |
| 5. Negative affect | 1.82 | 0.58 | .02 | -.09 | -.09 | .00 | **.88** | | | | | | | | | |
| 6. Test 1 performance | 3.61 | 1.53 | -.16* | .08 | -.02 | .04 | -.06 | -- | | | | | | | | |
| 7. Positive event[a] | 0.50 | 0.50 | -.07 | .22* | -.07 | -.02 | .10 | .08 | -- | | | | | | | |
| 8. Negative event[b] | 0.50 | 0.50 | .14 | .05 | -.08 | .00 | .03 | .00 | -- | -- | | | | | | |
| 9. Mindfulness[c] | 0.51 | 0.50 | -.02 | .06 | .07 | .15 | -.09 | -.14 | -.04 | -.07 | -- | | | | | |
| 10. Internal attribution | 4.57 | 1.36 | -.10 | -.04 | -.10 | .23** | .09 | .07 | -.07 | -.17 | .09 | -- | | | | |
| 11. External attribution | 3.00 | 1.44 | .00 | -.08 | -.10 | -.09 | .11 | .00 | -.01 | -.05 | .12 | -.09 | -- | | | |
| 12. Productive thinking | 2.55 | 1.42 | -.12 | .15 | .09 | .13 | -.03 | -.01 | .24* | -.07 | .04 | .04 | .17* | **.72** | | |
| 13. Persistent thinking | 2.52 | 1.29 | .10 | -.12 | .03 | -.06 | .20* | -.14 | .09 | .03 | .04 | .02 | .26** | .40** | **.88** | |
| 14. Cognitive reappraisal | 2.66 | 1.59 | .02 | .01 | .03 | -.09 | .05 | -.08 | .12 | .11 | .05 | .06 | .15 | .34** | .49** | -- |
| 15. Test 2 performance | 3.38 | 1.44 | .03 | .07 | .08 | .00 | -.04 | .37** | .09 | .13 | -.05 | -.06 | -.07 | .10 | -.09 | .08 |

*Note.* N = 158 undergraduate students. Internal consistency reliabilities are shown on the diagonal in bold.

[a] Positive event ("0" control group; "1" positive event group who received false positive/success performance feedback for Test 1).

[b] Negative event ("0" control group; "1" negative event group who received false negative/failure performance feedback for Test 1).

[c] Mindfulness ("0" mindwandering condition; "1" mindfulness condition).

*$p < .05$. **$p < .01$.

Table 3

*Means, Standard Deviations, and Intercorrelations Among Study Variables for Study 3*

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Sex[a] ("0" male; "1" female) | 0.56 | 0.50 | -- | | | | | | | | | | | | | | |
| 2. Age[a] | 37.04 | 10.06 | .13 | -- | | | | | | | | | | | | | |
| 3. Meditate[a] | 1.89 | 1.21 | .11 | -.03 | -- | | | | | | | | | | | | |
| 4. Positive affect[a] | 3.56 | 0.77 | -.09 | .00 | .23** | **.93** | | | | | | | | | | | |
| 5. Negative affect[a] | 1.60 | 0.69 | -.08 | .05 | -.03 | -.34** | **.96** | | | | | | | | | | |
| 6. work hours[a] | 20.39 | 16.36 | .0 | -.13 | .20* | -.02 | .08 | -- | | | | | | | | | |
| 7. MTurk[a] ("0" Qualtrics; "1" MTurk) | 0.64 | 0.48 | -.1 | -.21* | -.20* | -.11 | -.23** | .03 | -- | | | | | | | | |
| 8. Positive event[b] | 2.69 | 2.15 | -.12 | -.04 | .11 | .37** | -.06 | .16* | -.23** | -- | | | | | | | |
| 9. Negative event[b] | 1.83 | 1.47 | .03 | .02 | .12 | .11 | .12 | -.04 | -.05 | .15** | -- | | | | | | |
| 10. Mindfulness[a] ("0" control; "1" mindful) | 0.57 | 0.50 | -.11 | -.18* | -.08 | .00 | .03 | -.12 | .08** | -.02 | -.10** | -- | | | | | |
| 11. Internal attribution[b] | 4.04 | 1.94 | -.05 | .12 | .14 | .36** | -.21 | .26 | -.17** | .69** | -.42** | .00 | -- | | | | |
| 12. External attribution[b] | 3.62 | 1.87 | .18 | -.04 | .28* | .12 | -.08 | -.05 | .04 | -.23** | .35** | .02 | -.19** | -- | | | |
| 13. Productive thinking[b] | 2.56 | 1.52 | -.06 | -.06 | .09 | .50** | -.31* | .25 | -.12* | .81** | -.63** | .11 | .63** | -.21** | -- | | |
| 14. Persistent thinking[b] | 3.69 | 2.01 | .02 | -.03 | .21 | -.04 | .22 | .11 | -.24** | .23** | .15* | -.10 | .31** | .15* | .24** | **.80** | |
| 15. Cognitive reappraisal[b] | 2.68 | 1.76 | .10 | .11 | .11 | .15 | .10 | .15 | -.25** | .26** | .01 | -.03 | .36** | .15* | .31** | .63** | -- |
| 16. Performance[a] | 0.05 | 0.51 | .02 | -.09 | .16 | -.24 | .14 | -.11 | .04 | -.22** | -.01 | -.04 | -.17 | -.04 | .04 | -.01 | -.02 |

*Note.* N = 1096 half day level responses and 149 participants . Internal consistency reliabilities are shown on the diagonal in bold.

[a] Level 2 variables at the person level. [b] Level 1 variables at the half day level. *$p < .05$. **$p < .01$.

Figure 1: Full theoretical model with hypothesized relationships.

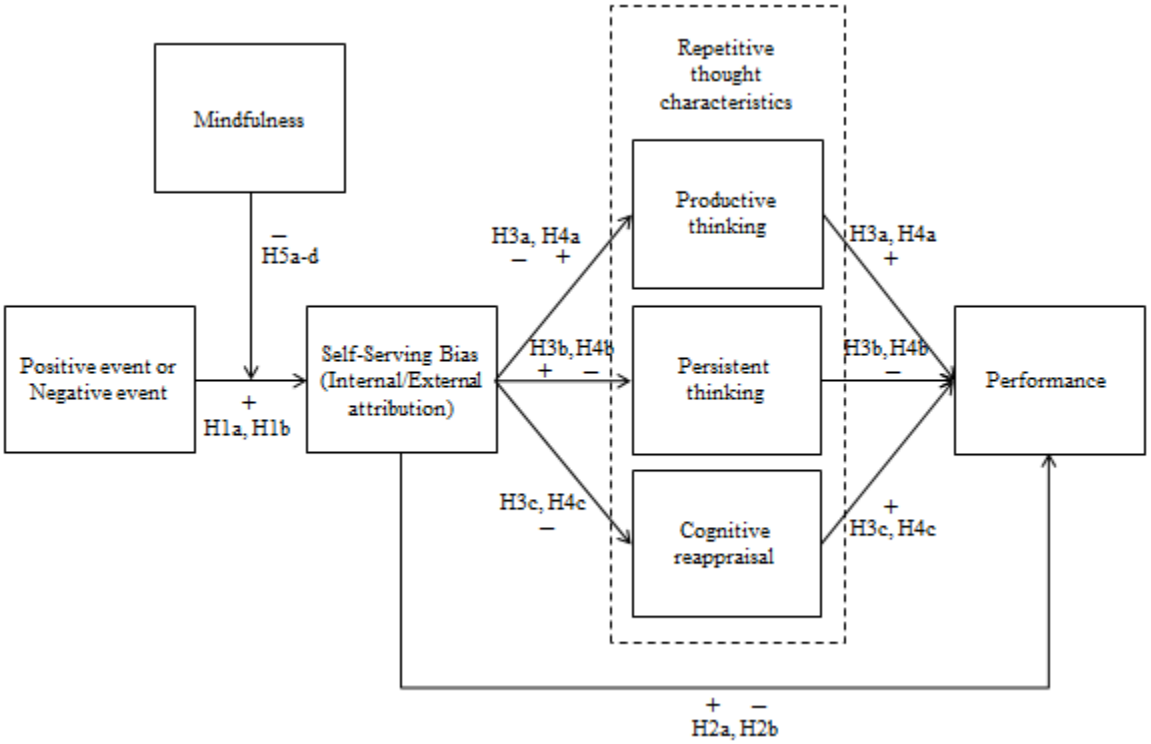


Figure 2. Structural model with Study 1 variables and standardized paths for positive event. Dashed lines represent $p > .05$, solid lines represent $p < .10$, and bold lines represent $p < .05$.

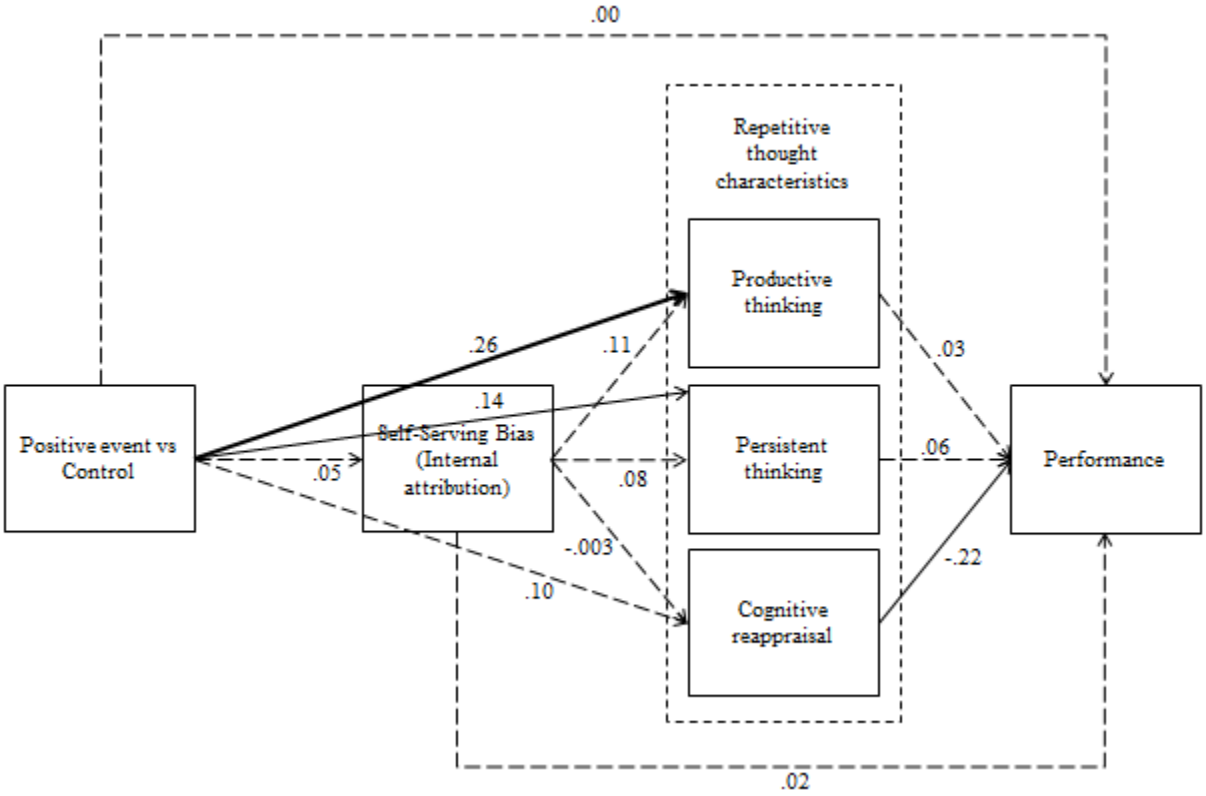


Figure 3. Structural model with Study 1 variables and standardized paths for negative event. Dashed lines represent $p > .05$, solid lines represent $p < .10$, and bold lines represent $p < .05$.

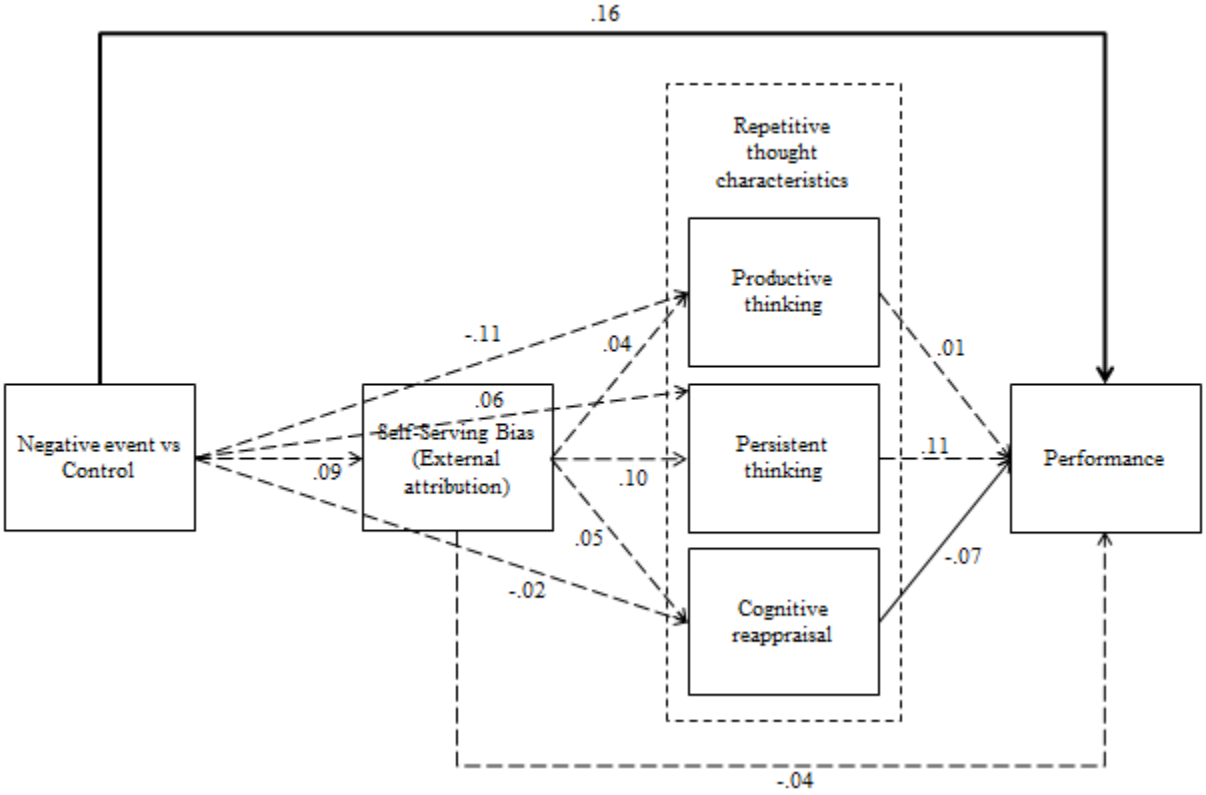


Figure 4. Structural model with Study 2 variables and standardized paths for positive event-mindfulness. Dashed lines represent p > .05, solid lines represent p < .10, and bold lines represent p <.05.

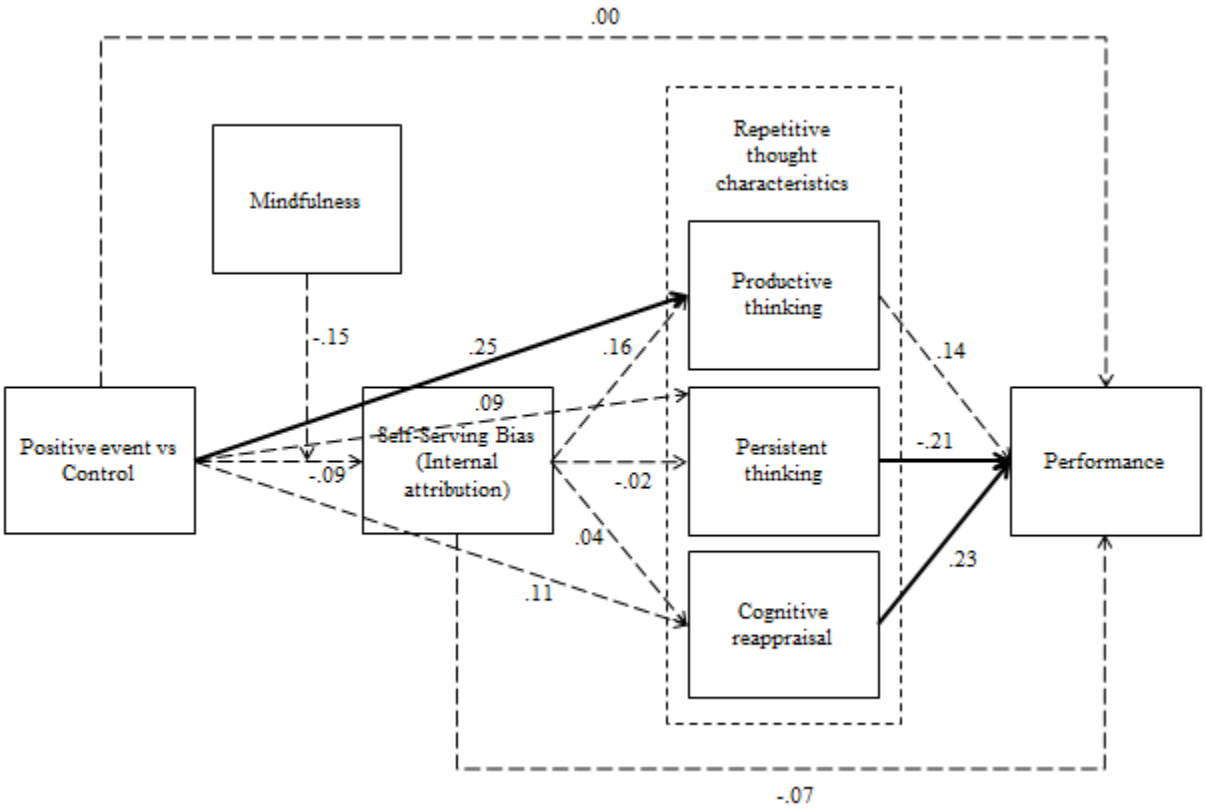


Figure 5. Structural model with Study 2 variables and standardized paths for negative event-mindfulness. Dashed lines represent p > .05, solid lines represent p < .10, and bold lines represent p <.05.

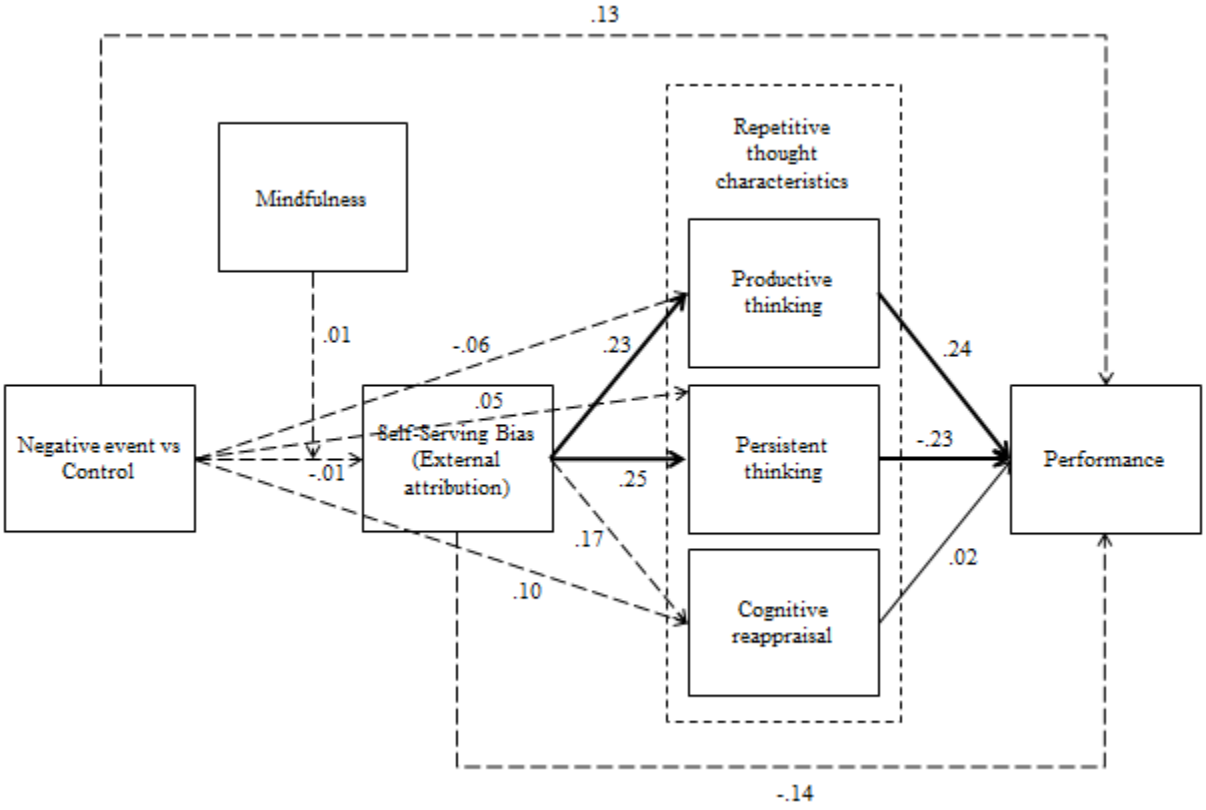


Figure 6. The interactive effect between positive affective event and state mindfulness on ratings of internal attribution for Study 2.

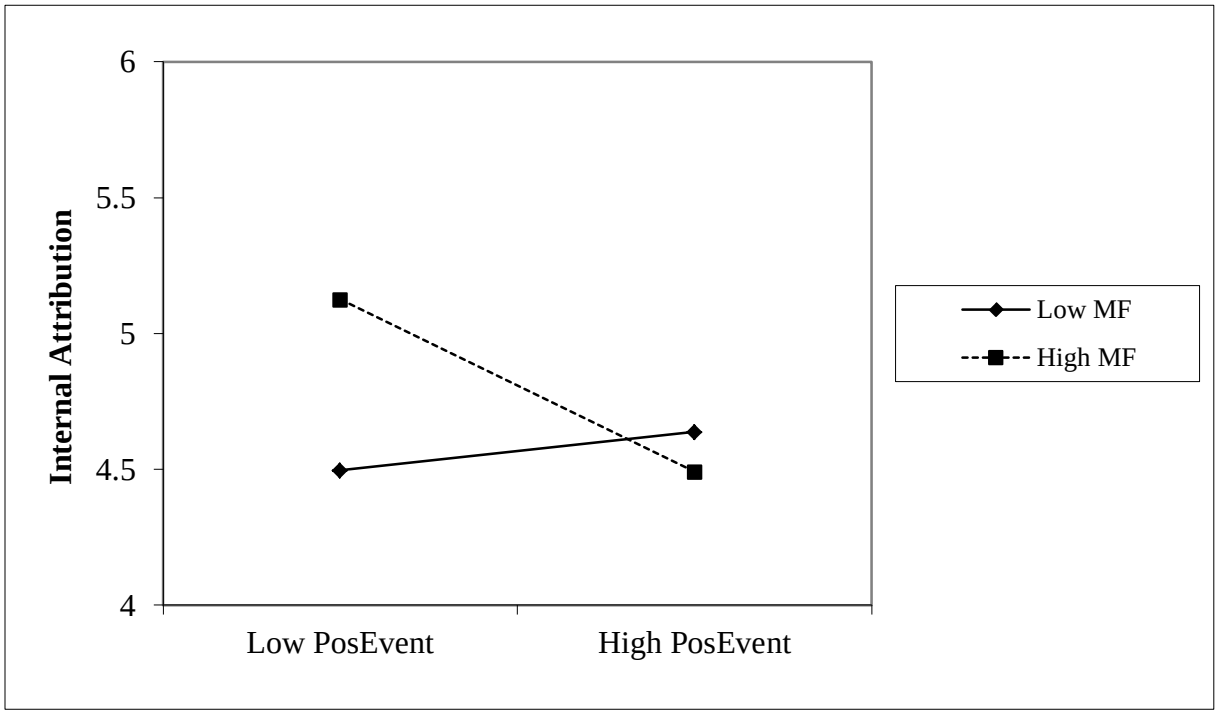


Figure 7. Structural model with Study 3 variables and standardized paths for positive event-mindfulness. Dashed lines represent p > .05, solid lines represent p < .10, and bold lines represent p <.05.

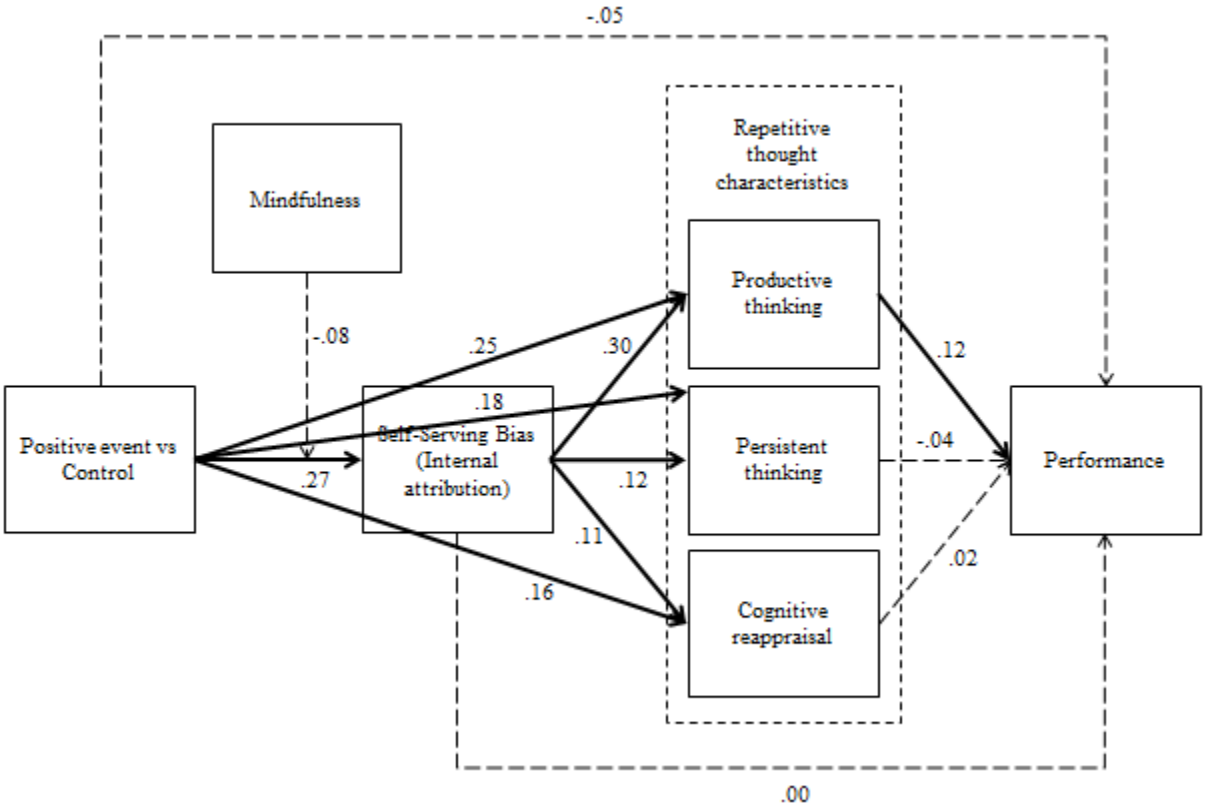


Figure 8. Structural model with Study 3 variables and standardized paths for negative event-mindfulness. Dashed lines represent p > .05, solid lines represent p < .10, and bold lines represent p <.05.

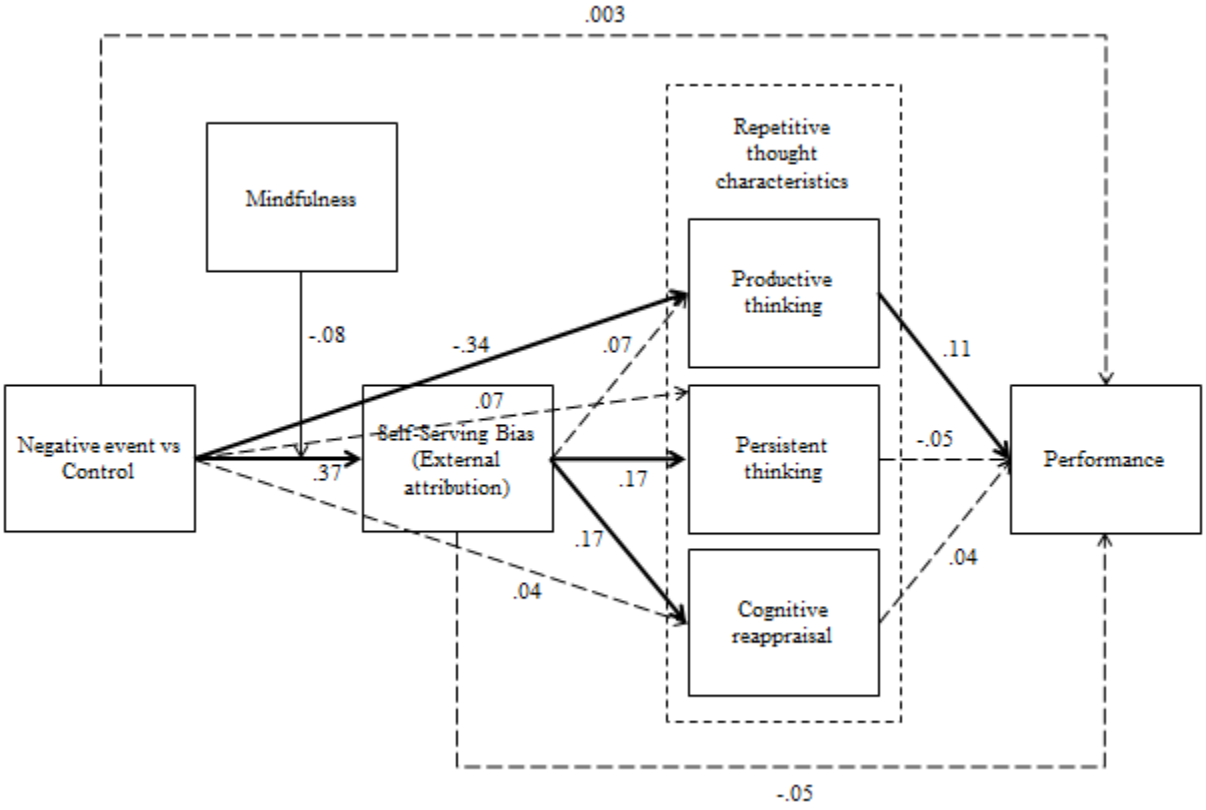


Figure 9. The interactive effect between positive affective event and mindfulness intervention on ratings of internal attribution for Study 3.

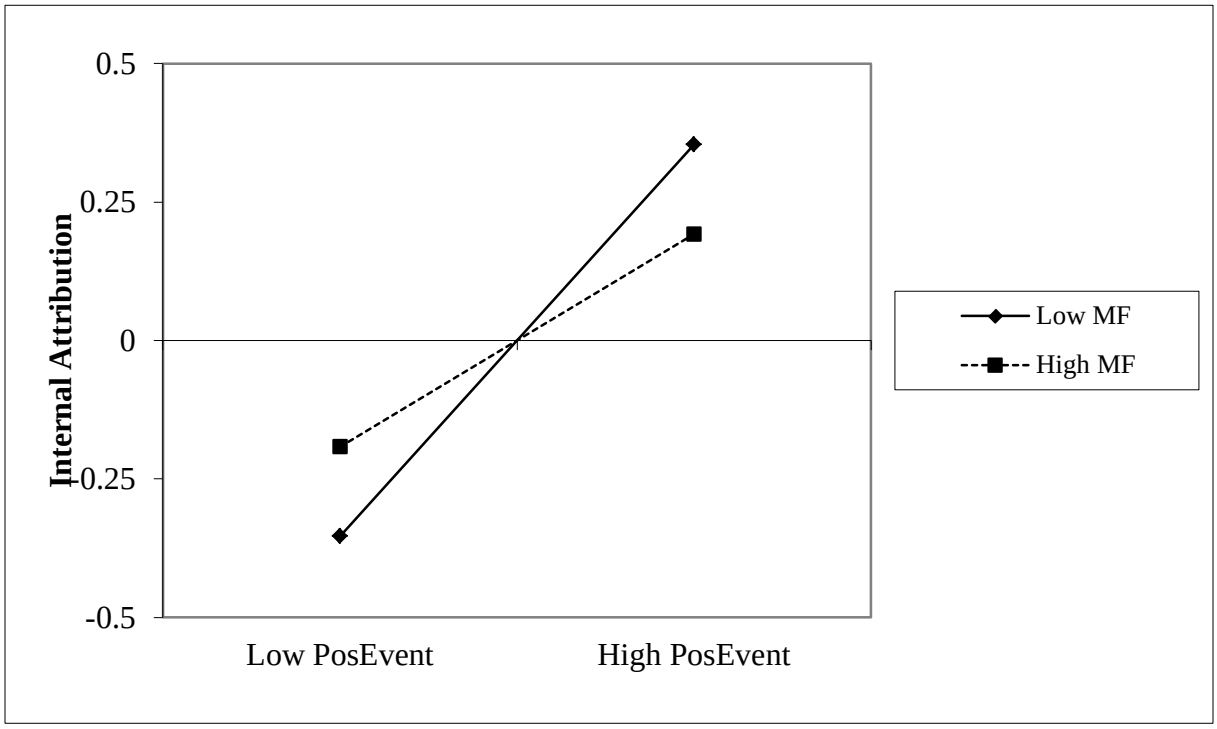
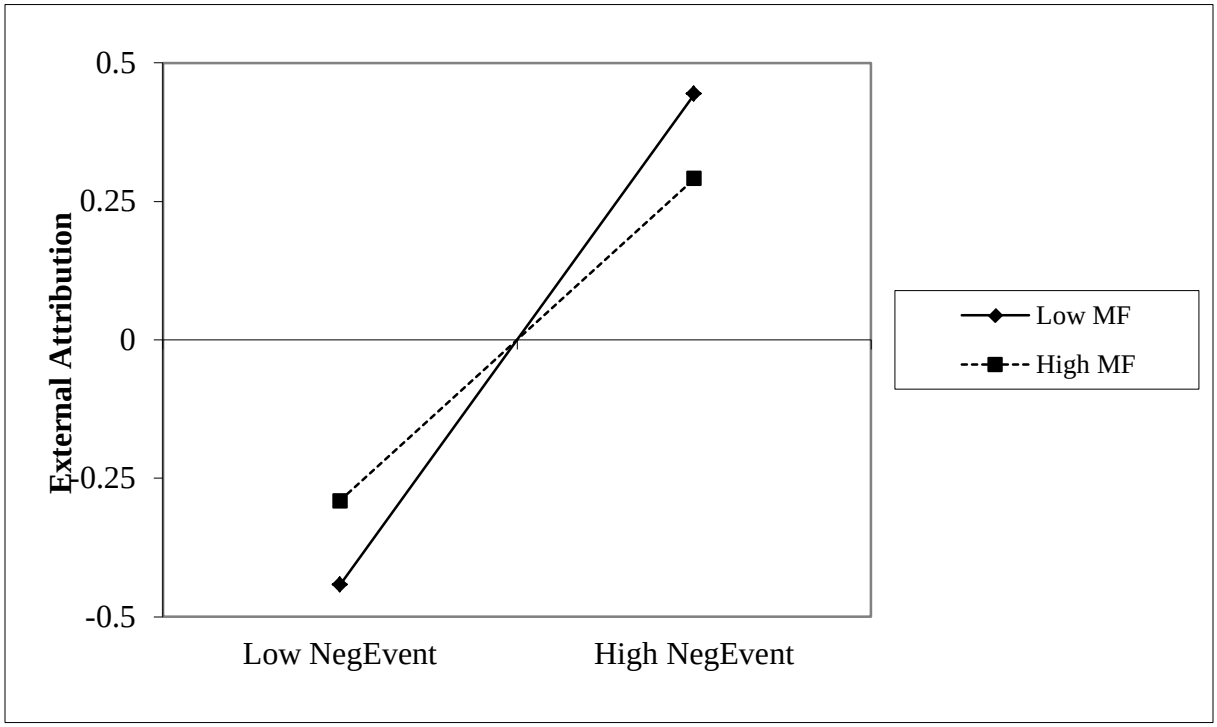


Figure 10. The interactive effect between negative affective event and mindfulness intervention on ratings of external attribution for Study 3.



## APPENDIX

### State mindfulness: Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003)

1. Today I found it difficult to stay focused on what's happening in the present. (R)
2. Today I was doing jobs or tasks without paying attention. (R)
3. Today I was preoccupied with the future or the past. (R)
4. Today I was doing jobs or tasks automatically, without being aware of what I was doing. (R)
5. Today I was rushing through jobs or tasks without being really attentive to it. (R)

### Positive affect negative affect schedule (PANAS; Watson, Clark, & Tellegen, 1988)

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

### Demographic variables

1. What is your gender: male female
2. Please indicate your age: ____ years
3. What is your ethnicity (check all that apply):

    African American: ____
    Asian: ____
    Caucasian/White: ____

Hispanic: ____
Other: ____ (Please explain: _____)

4. Are you presently employed?
   Yes, full time_____
   Yes, part-time_____
   No, but have been employed previously_____
   Have never been employed_____

5. How many hours do you typically work each day?
6. What hours do you typically work from (e.g., 9 a.m. to 5 p.m.)?
7. Is English your first language? yes no
8. Please indicate your experience with meditation (1= *none*, 2 = *less than 1 year*, 3 = *1-2 years*, 4 = *3-4 years*, 5 = *5 or more years*)

**Links to Study 3 Daily Exercises for Mindfulness Intervention and Control Groups**

| | Mindfulness | Control |
|---|---|---|
| **Monday Morning** | Mindfulness Meditation of the Body and Breath | Power Posing with Amy Cuddy (Ted Talk) |
| **Monday Evening** | Mindfulness Meditation of the Body and Breath | Derek Sivers: Keep Your Goals to Yourself (Ted Talk) |
| **Tuesday Morning** | Mindfulness Befriending Meditation | Clint Smith: The Danger of Silence (Ted Talk) |
| **Tuesday Evening** | Mindfulness Body Scan Meditation | Stress Management Strategies |
| **Wednesday Morning** | Three Minute Breathing Space | Angela Lee Duckworth: The key to success? Grit (Ted Talk - 5:43 min) |
| **Wednesday Evening** | Meditation for Working with Difficulties | Arianna Huffington: How to succeed? Get more sleep |
| **Thursday Morning** | Sounds and Thoughts Meditation | Paolo Cardini: Forget multitasking, try monotasking |
| **Thursday Evening** | Body Scan for Sleep | Richard St. John: Secrets of success in 8 words, 3 minutes - 3:46 min |
| **Friday Morning** | Loving Kindness Meditation | Matt Cutts: Try something new for 30 days |
| **Friday Evening** | Silent Meditation | Dr. Maya Angelou: 3-word Secret to Living Yur Best Life |

# One Week Mindfulness Self-Training Manual

## *Part 1: What is this Training About?*

In the following week, we will introduce you to some mindfulness exercises and ask you to integrate these into your daily routine. Given we will only communicate with you through the daily exercise instructions, it is important that you track your own progress and perform the exercises described here as thoroughly and regularly as possible. This requires about 5-8 minutes of your time twice a day to practice the exercises (once in the morning and once in the evening). Research has shown that the positive effects of mindfulness are most powerful when practiced daily. If you wish to practice more than twice a day or for longer periods of time, that is optional but not required. We are asking for a twice a day, 5-8 minute commitment at a minimum.

Being mindful is not easy. Especially at the beginning, you may find it difficult not to be distracted during the mindfulness exercises. Do not get frustrated; it will get easier with regular practice. Consider the journey and not the destination as the goal. You are likely to be surprised with how every small step can improve your experience of mindfulness.

Some of the exercises might feel funny or silly to you at first. Nonetheless we are asking you to practice earnestly and without judgment. Only if you follow the proposed program as accurately and completely as possible can we evaluate the effectiveness of this training rigorously.

## What is Mindfulness?

*Mindfulness is the non-judgmental and conscious perception of the present moment. It involves becoming aware of your mind and body intentionally and accepting your experiences as they are. It is not about trying to get anywhere or achieve anything in particular; rather it is about allowing yourself to be where you already are and becoming familiar with your actual experiences in the present moment* (Kabat-Zinn, 2009; 2013).

Mindfulness originates in the Buddhist tradition and describes a state of awareness – in which one centers one's attention in the 'here and now' and realizes awareness of everything outside and inside.

Every human has the capability to be mindful. Yet, too many times, because we are busy thinking about the past or the future, we are missing out on being in the present moment.

Through regular exercise we can improve our mindfulness by guiding our attention to the 'here and now'. Being mindful means switching off our 'autopilot' and the constantly bubbling voice inside our head. Through mindfulness, we are no longer a slave to our thoughts and ruminations. Mindfulness allows us to encounter any situation or experience nonjudgmentally and with full attention.

In order to cultivate mindfulness, we recommend the following:

1. Try to gain awareness of the **present moment**; practice to become aware of events, bodily sensations, feelings or thoughts as they arise in the present moment.

2. Seek a **nonjudgmental approach** towards events, other humans, and your own sensations, feelings, and thoughts. Everything we experience tends to lead to a flood of associations and automated thoughts. Being mindful means acting in every situation, even in uncomfortable and fearful ones, with an open and nonjudgmental attitude. This is by no means easy and requires time and practice.

3. Different from many other stress-management techniques, mindfulness is *not about working to become* more relaxed, become a better person, control your pain, or worry less; such an agenda is likely to undermine the cultivation of mindfulness. Rather try to simply pay attention to what is happening. If you are feeling tense or worried or disappointed with yourself, just be aware of those feelings. Try to embrace the experience without getting caught up in your thoughts or trying to change them.

Importantly, this does not mean that you have to like everything you are experiencing or that you passively accept them. It means that you are open to see and experience things as they are.

4. The practice of mindfulness is not limited to formal mindfulness meditation exercises. Try to establish the **pursuit of mindfulness as the basic 'life-policy'** in all areas of your life. Pay greater attention to what you are experiencing from moment to moment. Try to let go of your *thoughts about* what happens, has happened and might happen in the future, in order to really *experience* what happens in this moment. For example, instead of thinking about how you are enjoying a wonderful dinner with a friend, how this reminds you of another dinner you had in another restaurant, and why you haven't done this more often, enjoy the dinner itself, the taste of the meal and the feelings you experience in this very moment. Trying to be mindful is possible in almost any situation: during meals, while taking a shower, driving a car, taking a walk, listening to music, talking to others, and even while working.

## Possible Obstacles on your Path to Mindfulness

### Appearance of Unpleasant Feelings

Unpleasant thoughts, sensations, and feelings might unexpectedly arise during the mindfulness exercises. Try to resist stopping the exercise if this happens. See these unpleasant feelings as a challenge and train yourself to become aware of unpleasant thoughts and feelings and then let them go again. Learn to observe them from a distance, then let them go and engage in the present moment again.

That said, if you find that feelings and thoughts are overwhelming to you**,** you should end the exercise. If this happens, we welcome you contacting the principal investigator of this study and ask for advice.

**Suppressing Unpleasant Thoughts, Feelings, or Sensations**

Sometimes during meditation you may feel inclined to suppress unpleasant thoughts, feelings, or sensations. However, the goal of the path to achieving mindfulness is to not only welcome positive thoughts but also negative thoughts, feelings, and sensations, to become aware of them, to observe them our awareness and to be open to the thoughts and feelings that arise during mindfulness practice without losing yourself in them. Try to embrace them all, acknowledge them, experience them and then let them go.

**Practicing Mindfulness Takes Time and Discipline**

Mindfulness requires practice. In order to reap its benefits, you need to cultivate it systematically in your life through regular practice. Because time is scarce, you might feel you do not have (enough) time to meditate. You may also feel too tired and exhausted to focus during your mindful practice. Nevertheless, attempt at least a few minutes. Be aware that the times in which we feel too exhausted and stressed to do the practice may be the times in which we need it the most.

***Part II: Introduction of the informal mindfulness practice***

**Raisin/Nut Exercise**

Our first exercise doesn't take long and will prepare you for the exercises next week. Please select a little object – preferably a nut or a raisin – and choose a room where nobody will disturb you.

**Take the object into your hand**

Imagine you are seeing a nut for the first time in your life. You do not know how it feels, how it smells or how it tastes. Explore the color and the surface of the nut for a few moments. Pay attention to the round parts of the nut, to its shell and how the light reflects on it. Rotate the nut in between your fingers and appreciate how many different details you discover. Close your eyes and feel the texture of the nut again. Do you see a difference? If so, what kind of difference?

**Hold the nut in front of your nose**

Do you feel the sensation in your arm while you hold the nut in front of your nose? While breathing pay attention while breathing the nut has an aroma. Pay attention to how you feel and what kind of body reaction you experience when you smell the aroma.

**Bring the nut to your mouth**

Guide the nut slowly to your lips and concentrate on how your hand and your arm are moving. Place the nut carefully on your tongue. Sense the weight of the nut on your tongue. Roll the nut around in your mouth and pay attention to how your tongue moves. Take the nut between your teeth and slowly move your teeth towards each other. As you begin to chew, take in the range of unfolding experiences - the changing of taste and consistency of the dissolving nut. Notice how you chew and when you start swallowing.

Observe the sensation in your mouth after you have finished swallowing the nut. Notice the after-taste. How do you feel now? Did it make a difference if you do something being fully aware and attentive? If you felt a difference, you have achieved mindfulness.

The Essence of mindfulness is to be aware of your actions while you are doing them.

## Bringing Mindfulness to Our Everyday Life

The following exercise can be done anytime and anywhere, so we ask you to repeat this exercise on a regular basis. Choose one or more routine activities that you do every day like brushing your teeth, showering, drying yourself after a shower, driving a car, biking home, eating a meal, washing the dishes or taking a walk. Or maybe try choosing an activity during which you tend to get lost in thoughts. Start with only one activity; later you might extend this exercise to many more activities and integrate it anywhere into your daily routine.

Once you have chosen an activity, try to perform this activity with your fullest and undivided attention. While doing so, you may get distracted by thoughts. For example, you may get distracted by a thought like, “What a dumb exercise”, or “It is difficult, I am not able to do it”. You may also get distracted by thoughts of upcoming tasks or hearing other sounds. This is absolutely normal and nothing to worry about. Simply realize that your mind has wandered and gently bring your attention back to the mindfulness practice. Be kind to yourself; everyone gets caught up in thoughts from time to time. Our minds are like an inner radio which is constantly playing and does not have an “off” button. Gradually, we can find this “off” button with regular mindfulness practices and can more and more easily return to the present moment.

## My Mindfulness Plan

Decide on the activity that you will mindfully experience in the coming days. It is helpful to write this activity on a notepad and hang the note up in a place where it will constantly remind you (e.g. the mirror in your bathroom or on your computer screen). Once you have chosen an activity, please write it down on the bottom of this page. If you can’t think of an activity, you might choose from the suggestions below:

- Showering

- Going to work
- Eating breakfast or lunch
- Cleaning dishes
- Cooking
- Listening to music
- Brushing your teeth
- Looking out of the window
- Listening to birds singing
- Walking up and down the stairs
- Taking a walk
- Drinking a cup of coffee or tea

Now make a contract with yourself. In the coming days I would like to be mindful when I am:

1. _____

2. _____

3. _____

### *Part III: Introduction of the formal daily mindfulness practices*

In the following days we will introduce you to a number of formal mindfulness exercises that we ask you to perform twice a day. For your formal mindfulness practice, try to find a quiet place where you are unlikely to be disturbed. We advise you to do your formal mindfulness practice in the morning before work and in the evening before bed. We find individuals experience the most benefit when they start their day with a mindful attitude. If doing your mindfulness practice in the morning before work is not possible, you can also choose a later time in the day that suits you best. Thank you very much again for participating in our study. We hope these research-based practices will be beneficial to you and your work.