# VALIDATION OF EXPERIMENTAL METHODOLOGY FOR STATE MINDFULNESS INDUCTION IN A CONTROLLED LABORATORY SETTING

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Bachelor of Science in Psychology Chernihiv State University June 2013

submitted in partial fulfillment of the requirements for the degree MASTER OF ARTS IN EXPERIMENTAL RESEARCH IN PSYCHOLOGY

at

CLEVELAND STATE UNIVERSITY

May 2018

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## ABSTRACT

The exponential growth of mindfulness' popularity in both experimental and applied fields of psychology has revealed serious gaps in the relevant research methodology and theoretical groundwork which, in turn, has undermined the inferences about the beneficial nature of mindfulness. One of the methodological gaps is a lack of formally validated mindfulness induction procedures. The present research aimed to address this issue by experimentally validating a 5-minute body-centered guided meditation as an effective method of mindfulness induction in a laboratory setting. The induction method was designed by an independent professional yoga and meditation teacher; it was designed to be brief, simple, body-centered, and not affiliated with any specific tradition of mindfulness practice. A four-group randomized-control pretestposttest study design was used in this study. Ninety-nine participants were recruited from the Cleveland State University student body. The Toronto Mindfulness Scale was used for the pretest and posttest assessments of state mindfulness. State mindfulness was measured twice in each group: (1) before and (2) either immediately after or 30 minutes after the induction procedure. The induction method was effective in increasing state mindfulness immediately after the mindfulness induction. The induction effect dissipated, but did not fully disappear, by the 30-minute mark. The control condition (sitting down and attending to one's thoughts and physical sensations) served as a low but stable mindfulness induction.

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*Keywords*: mindfulness, mindfulness research, mindfulness research methodology, mindfulness induction, the Toronto Mindfulness Scale, state mindfulness.

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## CHAPTER I

#### INTRODUCTION

Mindfulness is a trending topic in psychology. The number of published research papers about mindfulness and its effects on various psychological constructs has seen exponential growth in the last decade (Brown, Creswell, & Ryan, 2015; Van Dam et al., 2018). Mindfulness, as a unique state of consciousness, is attributed to many positive effects on levels of stress, anxiety, and depression (Hayes-Skelton & Wadworth, 2015; Carmody, 2009). It has been shown that mindfulness improves emotional and cognitive adaptive function (Chambers, Gullone, & Allen, 2009), as well as several specific physiological systems and dysfunctions associated with them, such as immune system response (Davidson et al., 2003), chronic pain management (Veehof, Oskam, Schreurs, & Bohlmeijer, 2011), and irritable bowel syndrome (Ljotsson et al., 2011). The rapid growth in both mindfulness research and the popularity of mindfulness (Van Dam et al., 2018).

In response to the extreme enthusiasm about the positive effects of mindfulness on the human condition, several researchers have raised concerns about the validity of recent research findings in the field of mindfulness research in the context of ambiguity

of the meaning of the term "mindfulness" and the lack of a reliable methodological toolbox specifically designed to study mindfulness (Brown, Creswell, & Ryan, 2015; Van Dam et al., 2018; Davidson & Dahl, 2018). Van Dam et al. (2018) described the failure of modern empirical research to find scientific consensus about what mindfulness is and how to study it, warning researchers and the public of frequently overlooked possibilities of adverse effects of sensationalized claims about the benefits of mindfulness practice, which can "lead to people being harmed, cheated, disappointed, and/or disaffected" (Van Dam et al., 2018, pp. 37-38). Van Dam et al. (2018) express their hope that with more data, effort, and debate, the much-needed scientific consensus on fundamental questions about mindfulness can be reached. The present research is intended to contribute to the development of such consensus by providing a basic, yet very much needed, method to effectively and reliably induce mindfulness in laboratory settings.

The experimental research on mindfulness uses various methods to increase mindfulness through long-term training or via the one-time induction of a mindful state. Although the tradition of long-term mindfulness training in a clinical setting has been around for the last 20 years (starting with Kabat-Zinn's Mindfulness-Based Stress Reduction [MBSR] program [Kabat-Zinn, 1996]), there is no verified and validated method for one-time, brief inductions of a mindful state. The goal of the present research is to propose and validate a methodology for a reliable, brief mindfulness induction that is appropriate for the modern laboratory setting. The present study employed a randomized-control pre-test-post-test design. Following the assessment of premanipulation levels of mindfulness, participants were exposed to a brief mindfulness induction. The post-manipulation assessment of state mindfulness was taken immediately

after the manipulation in the first experimental group and 30 minutes after the manipulation in the second experimental group. Two control groups (0-minute and 30-minute) performed a control task consisting of quietly sitting for 5 minutes while attending to their thoughts and physical sensations.

Below I will review and examine how the state mindfulness induction, as a research method, (1) fits within modern conceptualization and operationalization of mindfulness; (2) how it fits within the existing measures of mindfulness; and (3) how it is currently used in various experimental designs. I will also briefly discuss how the gaps in the modern literature on mindfulness inform my research questions, the central hypothesis, and the predictions of the current study. While the present study is dedicated to the development of an experimental method for validating a brief-mindfulness induction procedure, the focus on state mindfulness as the dependent variable is intended to contribute to the overarching debate about mindfulness as a psychological construct, its definition, and our ability to measure its effects.

## **Conceptualization and Operationalization of Mindfulness**

Most of the attempts to operationalize mindfulness converge on the following three-part definition. Mindfulness is (1) a *non-elaborative, non-judgmental*, (2) *decentered present moment awareness* in which thoughts, feelings, or sensations that arise in (3) *the attentional field are* acknowledged and accepted as they are (Brown et al., 2015; Kabat-Zinn, 2015; Segal et al., 2002). There is a certain level of discourse and confusion among the researchers about mindfulness as a construct. This confusion largely rests on the theoretical division of the mindfulness construct into trait and state mindfulness. The differences between these two constructs will be highlighted later in

this section. For the sake of greater clarity, I will talk about mindfulness in three distinct ways: the mindful state, trait mindfulness, and state mindfulness. The term *mindful state* refers to a present moment physical and mental experience of mindfulness (Bodhi, 2011; Grant, & Rainville, 2009; Siegel, Germer, & Olendzki, 2009)<sup>1</sup>. In contrast, the terms *trait mindfulness* and *state mindfulness* are derived from the actual lived experience, mindful state. Modern psychological science separates the construct of mindfulness into two distinct forms: dispositional (trait) mindfulness and state mindfulness. These terms were developed exclusively for use in scholarly discussions and empirical scientific research. The term *state mindfulness* describes the quality of uninterrupted mindful awareness within a narrow window of time (Quaglia et al., 2015). In other words, state mindfulness refers to a unique state of consciousness which is achieved by engaging an array of cognitive processes in the present moment. The cognitive processes attributed to state of mindfulness vary over the theoretical frameworks of different researchers and can be organized in three distinct categories: (1) flexibility and breadth of attentional capacity (Bodhi, 2004; Dreyfus, 2011), (2) meta-awareness (Davis, & Thompson, 2015; Hargus, Crane, Barnhofer, & Williams, 2010), and (3) non-evaluative acceptance, non-judgmental orientation of cognitive processes (Quaglia, Brown, Lindsay, Cresswell, & Goodman, 2015). The most direct way to study mindfulness is through the investigation of presentmoment experience of mindful states. State mindfulness serves as a scientific proxy for the mindful state. Therefore, the importance of understanding and studying state

<sup>&</sup>lt;sup>1</sup> Mindful states can be spontaneous or cultivated through targeted meditation and movement practice. I regard mindful states as a natural occurrence of mindfulness, moments when a person inhabits the conscious space of mindful presence. Some dimensions of mindful states have been captured and described in the literature under the umbrella of trait or state mindfulness, and some are still ambiguous. Since the physical experience of any phenomenon, including the phenomenon of mindfulness, is our primary source of pure knowledge about it (Bitbol, 2014), the mindful state is the foundation of our understanding of mindfulness. "Lived experience is where we start from and what all must link back to, like a guiding thread," stated neuroscientists and philosopher Fransico Varela (Depraz, Varela, Vermersch, 2003, p. 120).

mindfulness cannot be underestimated. State mindfulness is a gateway to examining a real, present-time experience of the unique state of consciousness that is purported to be vastly different from a simple waking state (Brown, Ryan, & Creswell, 2007). The experience of the mindful state is a cornerstone for any further conceptualization and operationalization of the phenomenon, regardless of the chosen theoretical background, research goals, and cultural contexts. Without knowing what a mindful state is and how it operates, and how it can be affected, induced and terminated, the modern state of the mindfulness research is at best confusing, incomplete, and unconvincing. The study of state mindfulness requires a reliable method for induction and termination of mindful state. According to some researchers (Brown e et., 2007), before mindfulness can be examined in relation to other psychological concepts and outcome measures, researchers must be confident that their manipulation induces mindful state above and beyond expected changes in any other related constructs such as attention, mind-wandering, selfawareness, meta-cognition, psychological distancing, concrete and experiential processing.

*Dispositional (trait) mindfulness* concerns a general tendency to experience mindful states in a variety of situations and circumstances regardless of training or effort (Quaglia, Brown, Lindsay, Creswell, Goodman, 2015). Scholars are divided in their understanding of trait mindfulness<sup>2</sup>. This division is directly reflected in the research

<sup>&</sup>lt;sup>2</sup> Innatists believe that trait mindfulness is an innate quality of human beings wherein some people naturally experience mindful states more frequently throughout their lives than others. Supporters of this approach tend to study mindfulness as a trait in correlation with other psychological concepts via psychometric instruments such as self-report questionnaires. Supporters of the opposing school of thought, *constructivists*, adhere to the position that trait mindfulness is developed primarily through mindfulness training. They argue that mindfulness is better understood as a skill rather than as a set level of disposition. Anyone can learn to be mindful, and anyone can increase their trait mindfulness by increasing the frequency of mindful states experienced in their daily life. Usually, mindful states are achieved through formal meditation or formal practice of mindful movement, for example, yoga, tai chi, the Alexander

methodology selected by each respective theoretical camp, which in turn skews not only the interpretation of the empirical findings but also the type and quality of raw data collected. To resolve the uncertainty created by the academic debate about trait mindfulness, the proper baseline of mindfulness as a mental state (state mindfulness) needs to be established. The use of a valid state mindfulness induction procedure is imperative for any research attempting to contribute to establishing such a baseline. The proposed method of mindfulness induction may contribute to the resolution of the conceptual debate about the nature of the mindfulness construct by providing a tool for the reliable and immediate induction of a mindful state that might also be of use in future research on state mindfulness.

#### **Mindfulness Assessment**

There are four scales available for the assessment of state mindfulness: The State Mindful Attention Awareness Scale (Brown & Ryan, 2003), which features a two-factor structure (*attention* and *awareness*) and mirrors the Mindful Attention Awareness Scale used for the assessment of dispositional mindfulness; the Multidimensional State Mindfulness Questionnaire (Blanke & Brose, 2016), which features a three-factor structure: present-moment attention, acting with awareness, nonjudgmental acceptance;

technique. Supporters of the constructivist approach tend to study mindfulness as an outcome of mindfulness training.

Since the theoretical framework determines the selected research methodology (Shades, Cook, & Cambell, 2002), the two schools of thought diverge in their research designs. Thus, innatists tend to design studies that rely on psychometric instruments of mindfulness while probing its relationship with objective behavioral and neurophysiological outcomes such as the Sustained Attention to Response Task (SART), the d2- Concentration and Endurance test, the Continuous Performance test and others (Mrazek et al., 2012; Moor & Malinowsky, 2009, Schmertz, Anderson, & Robin, 2008; Quaglia, 2015).

Constructivists tend to favor longitudinal and cross-sectional study designs in which the effects of formal mindfulness training programs such as Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1996) and Dialectic Behavioral Therapy (DBT; Linehan, Schmidt, Dimeff, Craft, Kanter, Comtois, 1999) are tracked over time or compared with a naïve population. With research efforts concentrated in the field of dispositional mindfulness, both theoretical schools largely ignore the study of state mindfulness.

the State Toronto Mindfulness Scale (TMS; Lau et al., 2006) features a two-factor structure: *curiosity* and *decentering*; the State Mindfulness Scale (SMS; Tanay & Bernstein, 2013) also has a two-factor structure: *state mindfulness of the body* and *state mindfulness of the mind.* The TMS was chosen for this study because it is the only state mindfulness assessment designed to measure the effect of meditation practice on immediate levels of state mindfulness (Lau et al., 2006). The TMS has been widely used in previous research that incorporated a mindfulness induction in its design (Egan, Hill, & Foti, 2017; Erisman, & Roemer, 2010; Reynolds, Lin, Zhou, & Consedine, 2015; Kiken, Graland, Bluth, Palsson, & Gaylord, 2015). There are eight measures currently developed to assess trait mindfulness in an adult population, and two trait mindfulness scales adapted for use with adolescents and children.<sup>3</sup> The Mindfulness Awareness Attention Scale (the MAAS; Brown & Ryan, 2003) was chosen for this study because it has been tested in the broadest array of populations: undergraduates, clinical, community adult, and experienced meditators populations. The MAAS has also demonstrated high predictive validity compared to other trait mindfulness measures (Quaglia et al., 2015). The TMS and the MAAS will be used in this study and more details on those scales will be provided in the Method.

Recently, there have been several published articles questioning the sufficiency of the construct validity of mindfulness self-report measures (Quaglia et al., 2015; Van Dam

<sup>&</sup>lt;sup>3</sup> Most of the trait mindfulness scales are reflective of the innatist approach (mindfulness is a natural, innate predisposition) and therefore have a targeted application in studies not concerned with mindfulness training. There are only two measures (the Freiburg Mindfulness Inventory [FMI]: Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2016; the Toronto Mindfulness Scale [TMS]: Lau, Bishop, & Segal, 2006) that reflect the constructivist (mindfulness is a matter of training) approach and are generally used with mindfulness trainees. However, two trait mindfulness scales (the Five Facet Mindfulness Questionnaire: Baer, Smith, Hopkins, Krietmeyer, & Toney, 2006; the Mindful Attention Awareness Scale: Brown & Ryan, 2003) have demonstrated reliability and validity in both general and mindfulness-practitioner populations.

et al., 2018). The lack of construct validity undermines "the scientific integrity and reproducibility of empirical findings" (Van Dam, 2018, p. 43). The present research was designed to offer an alternative experimental methodology in the study of mindfulness. Namely, I assessed the change in mindfulness following a brief mindfulness induction, as measured by the difference between pre- and post-test administrations of the TMS. With such testing, it was possible to determine if and by how much the mindfulness induction actually induced state mindfulness. A properly validated mindfulness induction can both strengthen the self-report measures (e.g., the TMS, the MAAS) and replace them depending on the design of the particular experiment.

## **State Mindfulness Research Methodology**

A repeated literature search performed for this study over the period stretching from June 2016 to February 2018 did not reveal any published experimental studies on the intrinsic properties of the mindful state. However, there is a vast array of studies that examine the effect of state mindfulness induction on other cognitive capacities and neurophysiological outcomes. I will review several studies sampled from different fields of psychological science to examine the research methodology and the use of state mindfulness induction in experimental settings.

Mindfulness is presently studied using one of the following methods: (1) trait and state subjective measures, (2) brief experimental inductions, (3) mindfulness training programs, and (4) comparisons of advanced mindfulness practitioners to matched controls (Quaglia, Brown, Liindsay, Creswell, Goodman, 2015). In many instances, several methods are used in a single study design. Mindfulness training programs such as MBSR and Dialectical Behavior Therapy (DBT; Linehan, Schmidt, Dimeff, Craft,

Kanter, Comtois, 1999) have been peer-reviewed, tested in various populations and their effects on a wide array of verified outcome measures (e.g., EEG, fMRI, cortisol levels, behavioral task performance, second-person rating of behavior, cognitive functioning measures, emotion regulation measures) have been replicated in numerous independent studies (Quaglia et al., 2015). In contrast, the various forms of state mindfulness induction reported in the literature have never been formally validated through looking at the direct correspondence between the induction procedure and its influence on measures of state mindfulness. Despite recent criticism, the aforementioned four state self-report measures (TMS, SMS, State-MAAS, MSMQ) available to researchers today provide more reliable tools for studying state mindfulness as compared with the existing mindfulness induction procedures, if for no other reason than all self-report measures have been developed and validated using the scientific method.

The research methodology employed to study any psychological concept directly impacts the final understanding of the concept itself. Both our theoretical perspective and the research tools we select become a part of our understanding of those phenomena (Shadish, Cook, & Campbell, 2002). Since mindfulness and its effects are studied using a multitude of research methods, I will only briefly discuss the history of mindfulness research methodology while maintaining the primary focus on a narrow stream of mindfulness research that used state mindfulness induction in the experimental design. Mindfulness research originated in the field of clinical psychology (Brown, Creswell, & Ryan, 2015), which influenced the type of questions addressed by the first wave of mindfulness researchers: how do mindfulness-based interventions impact psychological disorders? This research was primarily aimed at studying mindfulness training as an

intervention for clinical populations. The questions about the nature of mindfulness and the ways to measure mindfulness became a target of psychological research later. The differentiation between two theoretical forms of mindfulness, trait and state, led to a fork in the road for the experimental researchers. While the majority of researchers applied their efforts to studying (and developing corresponding research tools to study) dispositional mindfulness, state mindfulness did not attract a large number of scholars beyond its use as a manipulation or a one-time treatment in experimental studies. Even then, the mindfulness induction procedures were borrowed from Buddhist or Vedic traditions without proper scientific validation of their effectiveness, longevity, and survivability in an artificial laboratory setting. Most researchers who used mindfulness induction in their study designs relied on a one-time manipulation check performed immediately after the induction or after the experimental task (Blanke, & Riediger, 2017; Egan, Hill, & Foti, 2017; Erisman, & Roemer, 2010; Kee, Chaturvedi, Wang, & Chen, 2013; Kee, Chatzisarantis, Kong, Chow, & Chen, 2012; Kiken, Graland, Bluth, Palsson, & Gaylord, 2015; Naranjo, & Schmidt, 2012; Petter, Chambers, Mcgrath, & Dick, 2013; Reynolds, Lin, Zhou, & Consedine, 2014). However, a compelling case can be made that the interpretation of the results of mindfulness manipulation check is impossible if the baseline of the mindful state before the induction was not recorded. This was the case in all of the studies cited above as well as in those reviewed in greater detail below.

The mindfulness induction procedure varied vastly across all research programs. For example, Kee's motor control lab routinely designed original mindfulness induction procedures combining sensory stimulus, breathing and a brief mindfulness instruction reinforced by the sound of chimes (Kee et al., 2012; Kee et al., 2013). In one of their

experiments, participants were to focus their attention on the way each inhalation and exhalation felt on the finger placed right under their nostril (Kee et al., 2013). In another experiment, after a brief instruction to be mindful, participants were asked to pay attention to the sensation of their hand submerged in a basin of water (Kee et al., 2012). Erisman and Roemer (2010) in their research on the relationship between the emotion regulation and state mindfulness used an original mindfulness induction procedure which combined a mindfulness exercise with an educational narrative about what mindfulness is and how it might feel in a ten-minute audio recording. Several years later, Reynolds et al. (2015) used the same mindfulness induction method in their study on the moderating effect of mindfulness on disgust-driven social avoidance, positing that the method was validated by the mere fact of being published. Many researchers modified Kabat-Zinn's Mindfulness-Based Stress Reduction training by taking instructional snippets and piecing them together according to a set of chosen principles, usually guided by the theoretical platform selected. For example, in the study of state mindfulness and acute experimental pain among adolescents, Biegel (2010) designed a mindfulness induction method, loosely based on Kabat-Zinn's MBSR training, and adapted it for use with adolescents by, according to the following flow of repeated three-step instructions: (1) direct awareness of the physical sensations of a specific body part such as an arm or a body function such as breathing, (2) acknowledge the mind's tendency to judge sensations and to get distracted, (3) direct awareness back to the physical sensation. Those are classic principles of the many traditions of meditation. However, they have yet to be shown to induce a measurable increase in state mindfulness after a very brief period of practice. Similarly, Kiken et al. (2016), trusted that a 10-minute-long body scan and breath

centering exercise performed by participants at home would reliably induce a mindful state. In contrast, other researchers adopted the stance that state mindfulness exists without much manipulation and only needs to be uncovered (Blanke & Riediger, 2017) or directed by mindful mindset instructions such as: "...be aware of any thoughts and feelings that may arise during the task. If you notice your mind beginning to wander, simply take note of this without elaborating or dwelling upon your thoughts, and gently bring your attention back to the image currently displayed on the screen" (Egan, Hill, & Foti, 2017).

In all these attempts to induce mindful states, the researchers left themselves open to valid criticism of the effectiveness of their manipulation. After all, they examined how mindfulness induction influenced other states but did not look at how the induction impacted mindfulness itself. My research is aimed at closing the gap in the existing state mindfulness research methodology by developing and validating a brief mindfulness meditation procedure as a reliable and appropriate induction tool for modern laboratory settings.

The present study was designed to assess the change in mindfulness scores at two test intervals: immediately after induction (0-minute mindfulness group) and thirty minutes after the induction (30-minute mindfulness group). Two control groups (0minute and 30-minute) performed a control task consisting of quietly sitting for 5 minutes while attending to their thoughts and physical sensations. The change in state mindfulness (computed as a difference between the scores of the state mindfulness survey post-test and pre-test) in all four groups was the main focus of this study.

## **Research Questions and Hypotheses**

**Question 1.** Does brief guided meditation induce state mindfulness above and beyond the levels of mindfulness achieved by quietly sitting in a chair? I predict that, in fact, the change between pre-test and post-test mindfulness scores ( $\Delta$ TMS = post-test TMS – pre-test TMS) will be significantly higher in participants who listened to a prerecorded 5-minute guided meditation compared to participants who merely sat for five minutes in a relaxed position.

**Question 2.** Does the induction of a mindful state survive for a minimum of 30 minutes? I predict that state mindfulness will decrease after a 30-minute period in both the mindfulness induction and the control groups, however, the retained gains in state mindfulness ( $\Delta$ TMS = post-test TMS – pre-test TMS) will be significantly greater in the mindfulness induction groups than in a control group, even when the mindfulness (TMS) post-test is administered 30 minutes after the mindfulness induction.

## CHAPTER II

## METHOD

## **Participants**

Ninety-nine participants (females N = 61, males N = 38, age M = 19.9) were recruited from the current Cleveland State University student body using the Sona online research participation system. Participants were offered 1.5 research participation credits for their participation in the experiment.

## Groups

Participants were randomly assigned to one of four groups: 0-minute mindfulness group (N = 27), 30-minute mindfulness group (N = 24), 0-minute control group (N = 23), and 30-minute control group (N = 25). A chi-square test of goodness-of-fit revealed that the female and male participants were equally distributed across all four groups (0-minute mindfulness group: 14 male, 13 female; 30-minute mindfulness group: 8 male, 16 female; 0-minute control group: 8 male, 15 female; 30-minute control: 8 male, 17 female), X<sup>2</sup> (3, N = 99) = 2.89, p = .41. An analysis of variance revealed that age did not vary significantly over the four groups, F (3,95) = 1.12, p = .34.

## Measures

**State mindfulness.** State mindfulness was assessed twice during the experiment, before and after the manipulation, by the Toronto Mindfulness Scale (TMS; Lau et al., 2006). The TMS is a two-factor scale uniquely designed to assess mindful states immediately after meditation. This measure consists of 13 items assessing the factors *decentering* and *curiosity*. The decentering factor consists of six items (3, 5, 6, 10, 12, 13) and assesses one's ability to be aware of one's thoughts and feelings without being entangled in them; the curiosity factor consists of seven items (1, 2, 4, 7, 8, 9, 11) and assesses the two qualities of awareness related to the experience of a mindful state: openness and curiosity (Lau et al., 2006).

The TMS instructions, printed in bold font at the top of the TMS itself, asked the participants to indicate the degree to which each of the 13 statements describe what they just experienced on a 5-point scale ranging from 0 (not at all) to 4 (very much), with higher scores indicating greater levels of state mindfulness. The TMS statements are written in the past tense to probe the recollection of immediate yet already passed experience. For the pre-test, participants were instructed to refer to whatever activity they were engaged in right before filling out the questionnaire. For the post-test, participants were instructed to refer to their most immediate past experience.

**Dispositional mindfulness.** The MAAS—an index of dispositional mindfulnesswas chosen for this study because of its broad application, sensitivity to mindfulness training, and predictive validity. The MAAS is a 15-item self-report measure designed to assess qualities of mindfulness not dependent on the immediate environment or performed activities (Bryan & Ryan, 2003). This scale features a two-factor design with attention and awareness as the two factors. Participants were asked to indicate their

agreement with each of the items on a 6-point Likert-type scale from 1 (almost always) to 6 (almost never). The MAAS has demonstrated reliability and validity in both general and mindfulness practitioners' populations and therefore was the most appropriate measure of dispositional mindfulness in an experiment in which the participants' previous exposure to mindfulness practices was unknown. The MAAS statements are written in the present tense to orient the participants to report about their most frequent experiences. The main purpose of administering the MAAS was to provide a check on the levels of dispositional mindfulness across the four groups in the study. Ideally, there would be no differences in MAAS scores across groups: Prior research demonstrated an interaction between levels of trait mindfulness and levels of induced state mindfulness (Kiken, et al., 2016).

**Mindfulness experience and caffeine intake.** The Health and Well-Being Activities Questionnaire (*Appendix 4*) was designed to assess the level of experience participants have had with different mindfulness practices. Ideally, the effectiveness of the induction procedure would be independent of the participant's experience and frequency of engagement in mindfulness practice. The questionnaire featured four questions about participants' experience with various forms of mindfulness training. In question 1, participants were asked to circle all mindfulness-based activities in which they engaged previously. The options are yoga, meditation, tai chi, or any other meditative practice. In question 2, participants were asked to circle the frequency with which they engaged in the circled mindfulness-based activities. Question 3 asked about the last time they practiced the circled activity. Question 4 asked about how long ago the participants consumed coffee or any other caffeinated beverage. Participants were

instructed to leave the question blank if none of the answers applied to them. In other words, if participants wanted to answer "no" or "never" to the question, they were asked to leave it blank.

**Basic demographic and health information.** Basic demographic information was collected, such as age, gender, participants' neurological and psychiatric conditions, medication, and hearing difficulties.

## Procedure

**Pre-test assessments.** At the beginning of the experiment, participants were asked to read the Informed Consent form in its entirety and sign its second page if they agreed with all details of the experiment. This instruction was necessary because a significant portion of undergraduate students appeared to view the Informed Consent casually, as a formality.

After reading and signing the Informed Consent form, participants were given three questionnaires: the Basic Demographic Information and Health Questionnaire, the Mindful Attention Awareness Scale, and the Toronto Mindfulness Scale. Brief verbal instructions about how to fill out each questionnaire were given according to the experimental script. The order in which the questionnaires were placed in front of each participant was not pre-arranged; each participant chose the order in which the questionnaires was completed.

**Mindfulness induction procedure.** After completing the initial paperwork, the participants were asked to sit comfortably in a chair. The 0-minute and 30-minute mindfulness groups were invited to listen to a brief recording; the 0-minute and 30-minute controls were asked to sit quietly and attend to their thoughts and the way their

body feels for five minutes. The experimenter promised to follow the same instructions (e.g., listen to the recording or sit quietly) and let the participant know when the time was up. The experimenter sat with her eyes closed in relaxed meditative position during both the mindfulness induction and the control condition. The presence of experimenter was intended to increase the likelihood that each participant would engage with the mindfulness induction and control condition. The experimenter modeled desired engagement, which also remedied any distraction her presence might have had on a participant had she sat in the room just observing the participant during the meditation. The experimental script was carefully written and followed. It did not mention the words "mindfulness" or "meditation" in any of the instructions. State mindfulness was induced by playing a 0-minute pre-recorded guided meditation (*Appendix A*) through the speakers of a laptop computer. The laptop was positioned on a desk facing away from the participant. The volume of the recording was set at the same level for every participant.

*Mindfulness induction method.* The mindfulness induction method was recorded by an independent professional meditation teacher. In order to reduce the influence of the experimenter's personal experience with meditation, the mindfulness induction was not scripted before the recording. Instead, the narrator was instructed to record a free-flowing body-centered guided meditation that complies with both her professional standards and the following guidelines: (1) it should be designed for a seated meditator; (2) it should not use mantras, chimes, primordial sounds etc.; (3) it should not reference any meditation or religious tradition; (4) it should reference physical sensations of the body as the main mindfulness induction method; (5) it should be accessible to those who have never meditated; (6) it should be 5 minute long recording; (7) it should generally be

appropriate for anoffice-like setting. The brevity of the induction procedure was necessitated for the following three reasons. First, the induction procedure was designed to be effective for both novices and experienced meditators. Novices are recommended to start with a brief, traditionally 5-minute long meditation. Novices frequently disengage and become anxious if the meditation lasts longer than 5 minutes. Second, the participants were seated in an office chair and not on a meditation cushion or a comfortable reclining chair as is the usual practice during formal meditation training. Meditation practitioners can experience neck and back tightness and uncomfortable body temperature shifts during a longer meditation which can be distracting and can result in disengagement from the induction. Usually, those common minor discomforts are remedied by pre-meditation preparations such as the use of cervical and lumbar support, the use of a blanket or multiple layers of clothing. Those additional preparations are not easily accessible in a laboratory setting and would have confounded the results. Third, the mindfulness induction method must be appropriate for laboratory research. As such, the mindfulness induction must be time limited, so that fatigue does not influence performance on subsequent experimental tasks.

The chosen mindfulness induction method relied on body awareness instructions to cultivate the three main facets of mindfulness: (1) present-moment orientation, (2) open and decentered attentional focus, and (3) non-elaborative, non-judgmental attitude. The guided meditation started with the breathing instruction ("Let's begin with three deep breaths. Take a deep inhale through the nose, let it out through the mouth"), followed by body awareness prompts such as "Become aware of your feet touching the ground", "And notice how the breath feels in your body", "Do you sense any tightness?", "If you feel

discomfort in your body, simply acknowledge it." The body-centering instructions were interlaced with prompts to cultivate a detached, open, accepting and non-judgmental awareness: "And when distracting thoughts pop into your mind, release any frustration. Simply brush those thoughts aside bringing your awareness back to your breath, back to the present moment", "But keep a detached awareness, allowing this sensation without reacting to it." The complete script of the audio recording can be found in *Appendix A*.

**Post-test assessments and procedure.** After the five-minute-long guided meditation (induction group) or quiet sitting (control group), the participants were asked to bring their attention back to the room. Both 0-minute mindfulness and 0-minute control groups were given the TMS and the Health and Well-Being Activities Questionnaire within one minute of the induction or control procedure.

The 30-minute groups (mindfulness and control) were given instructions about the task portion of the experiment after the induction or control procedure respectively. The participants were asked to engage in reading, writing or drawing activities of their choice as long as those activities were not done on any electronic devices. The experimenter presented several options of pre-selected activities and explained that the participant was free to mix and match or choose to do his or her homework as long as it would not involve the use of any electronic devices. Participants were told that surrender of their writing and drawing was voluntary. The experimenter then left the room to give participants privacy with a promise to check in on them in 15 minutes. At the 15-minute mark, the experimenter entered the lab to briefly ask if everything was going well and to remind the participant that there was 15 minutes left in the experiment. At the 30-minute mark, the experimenter returned to the lab and instructed the participant to finish working

on his or her task. Those who had chosen the reading task were asked to report the number of pages they had completed; those who chose any other tasks from the activity packet were asked to set the packet aside. Participants who engaged in their classwork studies were asked about the study subject and how many pages of notes or reading they had completed. This exchange was brief and lasted no longer than a few seconds. After participants terminated their tasks and briefly reported on the tasks in which they engaged, they were instructed to fill out the TMS and the Health and Well-Being Activities Questionnaire.

*Reading, writing, drawing, puzzles activities*. The activities were chosen to simulate average everyday activities while protecting the experimental design from the effects of task-specific confounding factors. The pre-selected activities were neutral, ordinary, pen and paper tasks, with a moderate cognitive load, and they were moderately engaging.

The pre-selected reading activity was *The Catcher in the Rye* (Salinger, 1951). This text was chosen because it is at a recommended 10th-grade reading level and because it features a first-person introspective narrative voice. Participants were asked to report how many pages they had read by the end of a 30-minute period. The drawing activities featured four options taken from Marion Deuchars' *Let's Make Some Great Art* workbook (Deuchars, 2011) and included pages such as "draw a smile of Mona Lisa," "a self-portrait," "fill the page with circles," and "fill the page with triangle options." The drawing activities were among the most frequently selected. Many participants continued to work on their original drawings on the back of the pages. Examples of the artwork are presented in *Appendix F*. The pre-selected writing activities consisted of two creative

writing prompts. The first writing prompt instructed the reader to write a story with each sentence starting with the next letter of the alphabet. The standard sized sheet of paper marked with each letter of the alphabet followed by three blank lines was provided. The second writing prompt instructed the reader to write a story about "a first" in their lives (e.g. their first car, their first apartment). Two blank sheets of paper were attached to the second writing prompt; it was on those sheets that participants wrote their stories. Examples of completed writing activities are presented in *Appendix G*. The puzzles were taken from the *Brain Games' Code Breaker* puzzle book. Both word and numeric puzzles were offered (*Appendix H*).

## **Data Analysis**

The plan for data analysis for this study included three main parts described in detail below. Initial analyses (ANOVA and Chi-square goodness of fit test) were used to verify that all four groups did not vary significantly in gender, age, reported health, mindfulness experience, trait mindfulness, and pre-test state mindfulness.

The main hypothesis testing was performed using an ANOVA in which Group Membership (induction, control) and Test Interval 90min, 30min) were between-subjects factors.. The  $\Delta$ TMS (change between pre-test and post-test TMS) was the main dependent variable in this analysis<sup>4</sup>. The ANOVA was followed by four single- sample *t*tests to investigate whether the change in state mindfulness was significantly greater than zero in all four groups Additional analyses of group differences in their choice of activities during the 30-minute period was performed using the Chi-square goodness of

<sup>&</sup>lt;sup>4</sup> Because mindfulness is a multidimensional construct (authors of the TMS identify two factors: decentering and curiosity), the TMS scores were broken down into its factors (decentering and curiosity) to explore whether mindfulness induction procedure affects both factors of the TMS similarly (*Appendix E*). The change score for each factor was used as a dependent variable in the analysis of variance with two levels of group membership (induction, control) and two levels of test interval (0 min, 30 min).

fit test; the main goal of those analyses was to shed light on how mindfulness induction interacted with the selection of different activities during the 30-minute period.

## CHAPTER III

#### RESULTS

#### **Baseline Group Differences**

The baseline for all variables in all four groups was examined using various statistical methods. Overall, the four groups (0-minute mindfulness, 30-minute mindfulness, 0-minute control, 30-minute control) did not vary significantly in age, gender, reported health, meditation experience, trait mindfulness, and the baseline (pretest) state mindfulness. A more detailed description is provided below.

**Reported health.** According to the chi-square test of goodness-of-fit test, there were no statistical differences across groups for participants who (1) reported diagnosis of a psychiatric or neurological disorder,  $X^2$  (3, N = 99) = 7.19, p = .07, (2) reported taking medication related to the disorder,  $X^2$  (3, N = 99) = 6.88, p = .08, or (3) reported hearing difficulties,  $X^2$  (3, N = 99) = 1.17, p = .76. In particular, there were four participants in the 0-minute control group (N = 23) who reported neurological disorder and three participants reported taking medication. There was one participant with a neurological diagnosis and one report of taking medication in the 0-minute meditation (N = 27) group. There was one participant who reported a neurological condition in the 30-minute control (N = 25) group. There was one participant with reported hearing

difficulties in each of these three groups: 30-minute meditation, 0-minute control, and 30minute control.

**Mindfulness experience.** Overall, 20 out of 99 participants reported never having had any experience with mindfulness, while 79 out 99 participants reported having had at least a one-time experience with mindfulness in the past. According to the chi-square test of goodness-of-fit test, experience of mindfulness practice in the past did not vary significantly over the four groups,  $X^2$  (3, N = 99) = .19, p = .99. Similarly, the distribution of the reported frequency of mindful practice was not different among all four groups,  $X^2$  (12, N= 99) = .14.32, p = .28 (Table 1). The distribution of participants across the four groups in terms of how long ago they engaged in mindfulness-based practice did not differ from the chance distribution,  $X^2$  (18, N = 99) = 21.3, p = .27. *Table 1* 

			EXPFREQUENCY						
			Never	daily	weekly	monthly	yearly		
Group	0minMindfulness	Count	6	2	3	12	4	27	
		% within EXPFREQUENCY	28.6%	28.6%	13.0%	41.4%	21.1%	27.3%	
	30minMindfulness	Count	6	2	4	7	5	24	
		% within EXPFREQUENCY	28.6%	28.6%	17.4%	24.1%	26.3%	24.2%	
	0minControl	Count	4	0	10	3	6	23	
		% within EXPFREQUENCY	19.0%	0.0%	43.5%	10.3%	31.6%	23.2%	
	30minControl	Count	5	3	6	7	4	25	
		% within EXPFREQUENCY	23.8%	42.9%	26.1%	24.1%	21.1%	25.3%	
Total		Count	21	7	23	29	19	99	
		% within EXPFREQUENCY	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	

#### **Frequency of Mindfulness Practice**

Trait Mindfulness and State Mindfulness Baselines. A one-way analysis of

variance (ANOVA) showed that there were no significant differences in the MAAS

scores between all four groups, F(3,95) = .23, p = .87,  $\eta_p^2 = .01$ . The baseline of state mindfulness (pre-test TMS scores) was compared between groups. There were no differences between pre-test TMS scores across all four groups as evidenced by the one-way ANOVA, F(3,95) = 1.06, p = .37.

## **Hypothesis Testing**

The hypotheses of this study were tested by using an ANOVA with two levels of Group Membership (induction, control) and two levels of Test Interval (0 min, 30 min). The pattern of the data in *Figure 1* suggests that the mindfulness induction was effective. The effectiveness of the mindfulness induction appears to be mostly be carried by the pre-test-to-post-test gains in the 0-minute mindfulness group (*Figure 1*).



## Figure 1

The gains in state mindfulness associated with the induction appear to dissipate over time while the control group remained at stable levels of state mindfulness across

time, albeit still showing some gains in the post-test state mindfulness scores (the change score is greater than zero in all four groups). Single-sample *t*-tests confirmed that all four groups had shown gains in their mindfulness levels that are significantly greater than zero. The Bonferroni correction for multiple comparisons was used to adjust the threshold for statistical significance for four single-sample *t*-tests. The new  $\alpha$  level was calculated by dividing the original level of  $\alpha$  (0.5) by the number of comparisons. The adjusted significance level for each *t*-test would be less than .05/4 = .0125, or p < .0125. Particularly, the gain scores in 0-minute control (M = 4, SD = 4.88), t(22) = 3.93, p =.001, 30-minute control (M = 3.68, SD = 4.4), t(24) = 4.18, p < .001, 0-minute mindfulness (M = 7.74, SD = 6.22), t(27) = 6.46, p <.001, and 30-minute mindfulness (M = 4.67, SD = 4.99), t(24) = 4.58, p < 0.001, groups were significantly greater than zero. An ANOVA revealed a significant main effect for the group membership (induction, control), F(1, 95) = 5.09, p = 0.03,  $\eta_p^2 = 0.5$ , such that gains in state mindfulness  $(\Delta TMS)$  were significantly higher for participants who had undergone the mindfulness induction (M = 6.29, SD = 5.83) than for those assigned to the control groups (M = 3.83, SD = 5.38). There was no significant main effect of the test interval (0 min, 30 min), F(1, 1) $(95) = 2.63, p = .11, \eta_p^2 = .03$ , indicating that the induction effect did not differ based on whether the post-test was conducted immediately or 30 minutes after the induction. There was no interaction effect between the group membership (induction, control) and test interval (0 min, 30 min), F(1, 95) = 1.73, p = .19,  $\eta_p^2 = .02$ .

Although the gains in levels of state mindfulness resulting from the induction dissipated over time, the mindfulness induction was effective above and beyond the gains in mindfulness in controls immediately after the induction. Controls experienced a small but stable increase in their mindfulness levels at both test intervals (0-minute and 30minute). The effect of mindfulness induction in the 30-minute mindfulness group matched the gains in mindfulness in both control groups. A low-level mindfulness induction effect was evident after thirty minutes in both mindfulness and control groups. In other words, even though the 0-minute mindfulness group saw significant gains in mindfulness (above and beyond the gains in controls) immediately after the induction, the 30-minute mindfulness, 0-minute control, and 30-minute control groups also experienced mindfulness induction.

#### Analysis of post-induction activities

A Chi-square test of goodness-of-fit analysis revealed some differences in participants' preferences for activities during the 30-minute test interval following the mindfulness induction. Participants from the induction group chose to engage in reading activities at a significantly greater rate than controls,  $X^2 (1, N = 49) = 5.13$ , p = .02. For example, 62% of non-readers were from the 30-minute control group, and 38% of non-readers were from the 30-minute mindfulness induction group. On the other hand, 73% of participants who chose to read were from the 30-minute mindfulness group and only 27% were from the 30-minute control group. However, there were no significant differences in the number of pages read by those who chose to read, regardless of their group membership,  $X^2 (13, N = 49) = 14.67$ , p = .32. In contrast, participants' choice to engage in writing,  $X^2 (1, N = 49) = .67$ , p = .41, art,  $X^2 (1, N = 49) = 1.01$ , p = .32, puzzles,  $X^2 (1, N = 49) = 2.99$ , p = .08, and schoolwork activities,  $X^2 (1, N = 49) = .003$ , p = .96, did not significantly differ from chance in the 30-minute control and 30-minute induction groups. For example, two participants from the 30-minute induction group and four

participants from the 30-minute control groups chose to engage in writing activities. Both 30-minute induction and 30-minute control groups had three participants each who chose to do their schoolwork.

## CHAPTER IV

#### DISCUSSION

## **Present Research Contribution**

Parallel with the explosive growth in the field of research on mindfulness, scholars started raising concerns about the scientific integrity of studies on mindfulness due to the ambiguity of the construct of mindfulness and lack of trusted ways to manipulate and measure mindfulness in a controlled lab environment (Brown, Creswell, & Ryan, 2015; Van Dam et al., 2018; Davidson & Dahl, 2018). The construct validity of mindfulness and the use of an appropriate methodology to study mindfulness are interconnected issues. It is difficult to reliably assess a phenomenon if there is no clear understanding and agreement about what the phenomenon is. At the same time, our understanding of the phenomenon is often informed and shaped by what we observe while attempting to measure or manipulate it. The utility of the present research is grounded in a belief that the study of mindfulness is best approached in a manner of step-by-step inductive reasoning. In other words, as a first step, we must establish a scientific consensus about what constitutes the experience of mindfulness (or state mindfulness as its scientific proxy) and how it can be generalized, described, and defined. A validated

mindfulness induction procedure must be used to reliably study the baseline of mindfulness as a construct. When we are confident that participants are experiencing a mindful state, we can attribute various changes in their performance, behavior, and neurobiological markers to the main properties of mindfulness. This will allow us to draw reliable inferences about what mindfulness is and what it is not as a psychological construct.

As a second step in the scientific exploration of mindfulness, we must have the appropriate methodological instruments to reliably manipulate and measure a mindful state. A primary form of scientific manipulation is induction. There has not been any formally validated mindfulness induction procedures to date. The present study has addressed this gap in mindfulness research and it serves as one of the building blocks for the development of much-needed experimental methodology in mindfulness research. That should enrich and diversify experimental designs currently available to mindfulness researchers. Moreover, the measurement of both trait and state mindfulness can be further strengthened when the performance on those measures is aligned with whether participants are experiencing a mindful state or not.

Additionally, while squarely focusing on contributing to the methodological issues by validating a mindfulness induction procedure, the present study also addressed theoretical concerns of mindfulness by bringing attention to state mindfulness as a primary, foundational form of the concept of mindfulness.

## **Control Procedure as a Light Mindfulness Induction**

Even though the brief guided meditation studied here was shown effective in inducing mindfulness above and beyond changes in the level of mindfulness caused by

merely sitting quietly for five minutes, there are several concerns that need to be addressed by future research. One of the concerns is that the control condition (sitting quietly for five minutes and attending to one's thoughts and physical sensations) has also shown gains in mindfulness scores that are statistically greater than zero. On the one hand, this change in pre-to-post scores in the control group can dilute the statistical significance of change scores in the induction group, making the mindfulness induction procedure seemingly less effective at the later test interval. On the other hand, the low but stable induction in mindfulness in both control groups (0-minute and 30-minute) provides a compelling argument for treating the chosen control task as a mild form of mindfulness induction. However, before asserting that the control task can be used as an easily accessible method for inducing low levels of mindfulness, other alternatives for the gains in mindfulness scores must be considered. One of the explanations for the gains in mindfulness scores in the control condition is a very characteristic threat to external validity in a randomized control-group pretest-posttest design: the interaction of pretesting and treatment (Dimitrov, & Rumrill, 2003). Participants might have become more susceptible to experiencing a mindful state after answering questions about it. Similarly, the interaction of testing effect and demand characteristics might have caused participants to rate their level of mindfulness higher in the post-test, either because they recognized the answers which prompted their desire to give an "improved" rating in the post-test or because they suspected that the change in how they answered was expected from them. Even though those threats to external and internal validity are very plausible, the randomized control-group design ensures that each group is affected by these threats equally; that would reduce concerns about the reliability of the experiment's results. The

argument for interpreting the pretest-to-posttest increase in state mindfulness in both control groups as a mild induction of state mindfulness is strong but it requires further investigation. Sitting down, slowing down and quieting down can all be viewed as prerequisites for shifting into a mindful state.

Another point of discussion in connection with the observed mindfulness gains in the control groups is the nature of the task that was designed to serve as a control condition. The control task consisted of quietly sitting for five minutes in a chair. The instruction "to attend to the way your thought and the way your body feels" was given immediately before the start of the task. Admittedly, this task was designed to incorporate three components of the majority of mindfulness exercises: sitting in a relaxed position, dampening of external stimuli (being quiet, frequently closing one's eyes), and focused attention on internal processes. This design allowed us to control for the behaviors that are common in both the meditative practice and daily life. Although the present research successfully demonstrated that the current mindfulness induction method was effective in increasing the level of state mindfulness above and beyond that of quietly sitting down and paying attention to one's thoughts, there are several ways that the design of future research can be improved so that the control condition is more control-like and it minimizes the chance of inducing mindfulness. For example, the control task can be redesigned to include listening to a 5-minute audio-recording of a neutral text. Alternatively, the control task can be eliminated and replaced by a control time period (five minutes) during which the participants are left with no instructions while they wait for the researcher to come back to the lab. These changes in the study design might eliminate or reduce mindfulness gains in control groups, which in turn might strengthen

our ability to observe the induction effect at both the 0-minute and, namely, the 30minute test intervals.

#### Longevity and Survivability of Mindfulness Induction

The effect of the proposed mindfulness induction was carried mainly by the 0minute group whose level of mindfulness was assessed immediately after the brief guided mindfulness indcution. Markedly, this effect dissipated but did not disappear in the group whose mindfulness was assessed thirty minutes after the induction. It is essential to establish the exact parameters of mindfulness induction longevity in the future research. We do not know if there is a relationship between the length of the induction procedure and the duration of its effect. Or, perhaps, intermittent mindfulness reminders like ringing a chime or saying, for example, "be mindful of the present moment" will mediate the dissipation of mindfulness induction. There is also a question of induction survivability through different types and levels of the cognitive tasks. Which activity during the test interval is more conducive to a more protracted retention of a mindful state: reading or engaging in artistic activity, for example? Finding answers to those questions will, in return, shed light on the nature of mindfulness.

### State Mindfulness Construct and its Accurate Assessment

Various theoretical frameworks of mindfulness identify different conceptual components of state mindfulness (SMAAS: Brown & Ryan, 2003; TMS: Lau et al., 2006; SMS: Tanay & Bernstein, 2013), which in turn are reflected in different factor structures of each respective state mindfulness assessment tool. For example, Brown and Ryan (2003) developed the State-MAAS which assesses two factors of mindfulness: *attention* and *awareness*. Blanke and Rose (2016) started from the assumption that state

mindfulness is one dimensional and then discovered three distinct dimensions of state mindfulness (present-moment attention, acting with awareness, nonjudgmental acceptance), which they incorporated in their Multidimensional State Mindfulness Questionnaire. The TMS (Lau et al., 2006) features a two-factor structure: curiosity and decentering and the SMS (Tanay & Bernstein, 2013) also has a two-factor structure: state mindfulness of the body and state mindfulness of the mind. It is unknown whether the same mindfulness induction method will affect different factors of state mindfulness (from different questionnaires) in a similar manner. That question requires further investigation and might serve as a vehicle for unifying various conceptualizations of state mindfulness. The present study revealed that, although mindfulness induction had a similar effect on both decentering and curiosity factors of the TMS, the control group (which showed small gains in mindfulness) did not follow the same pattern of results as in the induction groups. It appears that the effect of induction on the decentering factor mirrored the main effect of the induction. The dissipation of the induction effect (decrease in gains scores at the 30-minute interval) on the overall TMS was observed in both the induction and control groups. In contrast, the curiosity factor diverged from the general pattern of results. While the curiosity gain scores exhibited the same dissipation effect in induction group (decreased levels at 30-minute test interval compared with 0minute test interval), the pattern of the control's curiosity scores was reversed. The curiosity gain scores increased at the 30-minute test interval compared to those at the 0minute test interval in controls. In other words, while increased detachment (decentering factor) dissipated at the 30-minute test interval in both induction and control groups, the increased levels of introspection (curiosity factor) saw expected dissipation with the

passage of time only in the induction group while controls grew even more introspective at the 30-minute test interval.

## **Being Mindful Might Affect One's Choices**

Up to this point, we were asking questions about how various conditions affect the mindful state experienced by people in the present moment and how the relationship between the treatment (induction) and achievement of a mindful state can inform our understanding of mindfulness in general. However, there is a flip side to the questions that had been asked previously. How does a mindful state affect the way people perform tasks, make choices, or experience various stimuli? The present study only peripherally glanced at this question. It seems that mindfulness induction might have affected participants' preferences for some activities and not for others. Participants in both induction and control groups equally chose to engage in art, puzzles, schoolwork, and writing. However, those who have undergone a mindfulness induction chose to read more frequently than those who sat quietly for 5 minutes. It seems that being in a mindful state predisposed people to select reading over other available activities.

#### CHAPTER V

#### SUMMARY

The current state of the field of mindfulness research will require a concerted effort to improve existing procedures and develop new research methods explicitly tailored to the study of mindfulness. The present study contributes to building a stronger foundation of mindfulness research methodology by successfully validating a brief, simple, and neutral (not based on any tradition) mindfulness induction method. Following our conviction that the study of mindfulness is better served if approached through the study of state mindfulness first, an induction method is an essential tool in the toolkit of mindfulness researchers. Future research can both incorporate the present induction method in studies designed to gain more insights into the nature of mindful states and to explore more nuanced aspects of mindfulness induction such as its survivability, longevity, and independence from other activities.

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## Appendix A

## Body Centering Meditation Transcript

Let's begin with three deep breaths. Take a deep inhale through the nose, let it out through the mouth. Again, inhale. Exhale. One more time. And just relax your breath, relax your body. Become aware of your body sitting in your chair, feeling the connection of your body to the chair, feeling the support of the chair. Your body relaxes. Become aware of your feet touching the ground. Just noticing the sensation of the ground beneath your feet. Become aware of your breath. Just observing the rise and fall of the belly, the chest as the breath flows on its own. Connecting with that rhythm. And notice how the breath feels in your body. Do you sense any tightness? Is it open and relaxed? Is it shallow? Just observe without judging or analyzing. And when distracting thoughts pop into your mind, release any frustration. Simply brush those thoughts aside bringing your awareness back to your breath, back to the present moment. Just do this as many times as you need to whenever your mind gets distracted. Letting them go. If you feel discomfort in your body, simply acknowledge it thinking: "Yes, I feel discomfort there." But keep a detached awareness, allowing this sensation without reacting to it and then return to the breath. Throughout your day, practice acknowledging the present moment, even if you simply say to yourself: "This is me in this moment." Practice maintaining the sense of mindful awareness.

## Appendix B

## Mindful Attention Awareness Scale

#### Mindful Attention Awareness Scale

#### Description:

The MAAS is a 15-item scale designed to assess a core characteristic of dispositional mindfulness, namely, open or receptive awareness of and attention to what is taking place in the present. The scale shows strong psychometric properties and has been validated with college, community, and cancer patient samples. Correlational, quasi-experimental, and laboratory studies have shown that the MAAS taps a unique quality of consciousness that is related to, and predictive of, a variety of self-regulation and well-being constructs. The measure takes 10 minutes or less to complete.

#### **Day-to-Day Experiences**

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

l Almost Always	2 Very Frequently	3 Somewhat Frequently	4 what Somewhat ently Infrequently		5 Very Infrequently		/hat Very ently Infrequent		1	6 Imos Never	t
I could be exp conscious of it	eriencing some of until some time	emotion and no later.	ot be	1	2	3	4	5	6		
I break or spill paying attention	things because on, or thinking o	of carelessness f something els	s, not se.	1	2	3	4	5	6		
I find it difficu in the present.	lt to stay focuse	d on what's haj	ppening	1	2	3	4	5	6		
I tend to walk paying attention	quickly to get w on to what I expo	here I'm going crience along th	without he way.	1	2	3	4	5	6		
I tend not to not discomfort unt	otice feelings of il they really gra	physical tension ab my attention	on or	1	2	3	4	5	6		
I forget a perso told it for the f	on's name almos irst time.	t as soon as I'v	e been	1	2	3	4	5	6		

It seems I am "running on automatic," without much awareness of what I'm doing.	1	2	3	4	5	6
I rush through activities without being really attentive to them.	1	2	3	4	5	6
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6
I drive places on "automatic pilot" and then wonder why I went there.	1	2	3	4	5	6
I find myself preoccupied with the future or the past.	1	2	3	4	5	6
I find myself doing things without paying attention.	1	2	3	4	5	6
I snack without being aware that I'm eating.	1	2	3	4	5	6

## Scoring information:

To score the scale, simply compute a mean of the 15 items. Higher scores reflect higher levels of dispositional mindfulness.

#### **Reference:**

Brown, K.W. & Ryan, R.M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. Journal of Personality and Social Psychology, 84, 822-848.

# Appendix C

## The Toronto Mindfulness Scale

Please read each statement and indicate the extent to which you agree with each statement. In other words, how well does the statement describe what you just experienced, just now.

KEY:

"not at all" = 0

"a little" = 1

"moderately" = 2

"quite a bit" = 3

"very much" = 4

1 I experienced myself as separate from my changing	0 1 2 3 4					
thoughts and feelings.						
2 I was more concerned with being open to my experiences	0 1 2 3 4					
than controlling or changing them.						
3 I was curious about what I might learn about myself by	0 1 2 3 4					
taking notice of how I react to certain thoughts,						
feelings or sensations.						
4 I experienced my thoughts more as events in my mind than	0 1 2 3 4					
as a necessarily accurate reflection of the way things						
'really' are.						

5 I was curious to see what my mind was up to from moment to moment.	0	1	2	3	4
6 I was curious about each of the thoughts and feelings that I was having.	0	1	2	3	4
<ul><li>7 I was receptive to observing unpleasant thoughts and feelings without interfering with them.</li></ul>	0	1	2	3	4
8 I was more invested in just watching my experiences as they arose, than in figuring out what they could mean.	0	1	2	3	4
<ul><li>9 I approached each experience by trying to accept it, no matter whether it was pleasant or unpleasant.</li></ul>	0	1	2	3	4
10       I remained curious about the nature of each         experience as it arose.	0	1	2	3	4
11       I was aware of my thoughts and feelings without over identifying with them.	0	1	2	3	4
12 I was curious about my reactions to things.	0	1	2	3	4
<ul><li>I was curious about what I might learn about myself</li><li>by just taking notice of what my attention gets drawn</li><li>to.</li></ul>	0	1	2	3	4

## Appendix D

## Health and Well-Being Activities Questionnaire

- 1. Did you ever engage in any of the following activities?
  - a. Tai Chi
  - b. Yoga
  - c. Meditation
  - d. Other activity with meditative practice
- 2. If you circled any of the options from question 1, how often do you practice the

circled activity?

- a. Daily
- b. Weekly
- c. Monthly
- d. Yearly
- 3. When was the last time you practiced the circled activity?
  - a. Today or Yesterday
  - b. Last week
  - c. Last month
  - d. Last year
  - e. Within past 3 years
  - f. More than 3 years ago

#### Appendix E

## Factors of State Mindfulness

The TMS consists of two factors (decentering and curiosity). Additional analysis of variance was conducted to examine whether both of those factors were similarly affected by the induction procedure. Decentering change scores were subjected to a two-way analysis of variance with Group Membership (induction, control) and Test Interval (0 min, 30 min) as between-subjects factors. There were no significant differences in the pre-test (baseline) scores of both TMS factors: *decentering*, F(3,95) = 1.5, p = .22, and *curiosity*, F(3,95) = .57, p = .64.

There was a main effect of group membership on the decentering factor of the TMS, F(1, 95) = 3.22, p = 0.08,  $\eta_p^2 = .08$  (*Figure 2*).





Figure 2

There was no main effect of test interval on the decentering factor, F(1, 95) = 8.16, p = 0.05,  $\eta_p^2 = .03$ . There was no interaction effect between group membership (induction, control) and test interval (0 min, 30 min), F(1, 95) = .21 p = 0.65,  $\eta_p^2 = .002$ . The pattern of results in *Figure 2* is similar to the general pattern of TMS gain scores (*Figure 1*).

The curiosity factor was affected by the induction procedure in a similar direction as the general measure of state mindfulness in the induction group only. The controls exhibited a reverse pattern of results for the curiosity factor when compared with the pattern of results for  $\Delta$ TMS (*Figure 3*), such that controls saw a slight increase in their curiosity scores in the 30-minute groups compared to a 0-minute control groups.



## Figure 3

As a consequence, there were no main effect of either group membership, F(1, 95) = .12, p = 0.73,  $\eta_p^2 = .001$ , or test interval on the curiosity factor, F(1, 95) = .01, p =

0.91,  $\eta_p^2 < .001$ . There was no interaction effect between group membership and test interval, F(1, 95) = 2.01, p = 0.16,  $\eta_p^2 = .02$ . It appears that the effect of mindfulness induction on the  $\Delta$ TMS was driven by the decentering factor of the TMS. Additionally, the 30-minute control group's curiosity scores did not follow the general pattern of results. While both control and induction groups reported being more detached (decentering factor) immediately after the induction or quietly sitting, respectively, and less detached at the 30-minute test interval, only the induction groups reported similar effects on their introspection (curiosity factor), while the control groups reported greater levels of introspection at the 30-minute test interval.

# Appendix F

# Examples of Art Activities











## Appendix G

### Examples of Writing Activities

## Creative Writing Prompt #1

Describe a "first" (first apartment, first kiss, first time driving a car, first big success, first roller coaster ride). Include as many details as possible, be sure to include an aspect relating to each of the five senses (vision, hearing, taste, smell, touch)

#### START

My first time driving a car was about the yrs ago. I got my permit when I turned 151/2 and was very eager to drive as soon as I got home. I hopped in my moms ford fusion with "my dad. we live in the country iso my dad drove a capte streets down, to where there was pretty much no traffic except for Amish buggies. my dad did not

4

Seem netwoos, surprisingly. I was shill foll of excitement until I actually gor behind the steering wheel my hands started to get clammy and I forgot conich pedal was the gas and which me was the brake. My dad attempted to calm me down with ositive thoughts, but they did not help too much. I pushed down on the gas slowly and kept a constant speed of about 25 mph in a 55 mph speed limit done. The road I was on cas very hilly and windy, with trees changing colors and leaves blowing everywhere. It was a beautiful sight at I should have been paying more attention to the road. nce I approched the first hill I was petrified any I had the teer in the headlights' look and my mouth was completely Y. I reember I could faintly hear my duel laughing at I scared I was. The fact that we were in the country and it s a nice fall day meant farmers were avorking in their eds and police was everywhere which made my alleraies act Ut sudly I could still smell the maniure. After making it



## Appendix H

## Example of Puzzles



# **Finding a Mole** Be a superspy and track down the mole! Change just one letter on each line to go from the top word to the bottom word. Do not change the order of the letters. You must have a common English word at each step. **FIND** FOND FOLD FINE MOLE