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Attentional Preference After a Brief Mindfulness Meditation Intervention

Joshua John Hatherley
The University of Western University

Supervisor
Dr. John Paul Minda
The University of Western Ontario

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Abstract

It has been suggested that as a cognitive exercise, mindfulness meditation has the ability to significantly affect attention in its practitioners. This may help explain why mindfulness meditation has found success in clinical practices. This thesis sought to extend this line of research by investigating the influence of mindfulness meditation on attentional preference. In the context of this paper, attentional preference was seen to be the ability of the viewer to be biased to either detecting local components or the global whole. Study 1 investigated how a 10-minute breathing-oriented mindfulness intervention affects attentional preference on the Navon, Flanker and Simon tasks when compared to a similar relaxation exercise. Study 2 replicated and expanded on these results; adapting the design of Study 1 into a week-long study, and modifying the control group into a true control. Results indicate that on measures of attentional preference on global/local images, mindfulness meditation offers no significant improvement when compared to similar relaxation techniques or to an untreated control sample. This work suggests that mindfulness meditation does not impact attentional preference. Further research is needed in order to investigate whether different methods of mindfulness-based practices have greater effects.

Keywords: mindfulness, meditation, attentional preference, global processing, local processing, Navon, Flanker, Simon,

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Chapter 1

1 Meditation and Mindfulness

In its current appearance, mindfulness meditation is a mental-health oriented activity aimed at alleviating stress, promoting positive thinking, and in some cases managing physiological activity (reducing blood pressure, controlling chronic pain, etc.). Although often linked to its ancient Buddhist and Hindu origins, mindfulness, as it is currently practiced in North America, has only been around for the past thirty to forty years, gaining a recognizable status in the early 1970's. In part, this is due to the work of Dr. Jon Kabat-Zinn who opened the first mindfulness-based clinic at the University of Massachusetts Medical school in 1979 (Wilson, 2013).

As a social activity, meditation is fairly recognizable. Magazine covers and newspapers frequently offer a special edition on the subject, with a brief investigation into the benefits that it has on practitioner's lives. Other times it can be found in online and television advertisements, or on posters found in clinics, gyms, and wellness centers. Statistics Canada indicates that up to 40% of Canadians engage in prayer/meditation on their own weekly and that in the United States, meditation is in the top five complementary health practices, with 8% of adults activity using it (Clarke, Black, Stussman, Barnes, & Nahin, 2015; Wilkins-Laflamme, 2014). However, a great deal is still not fully understood about mindfulness. Its practitioners make claims about the effectiveness of meditation on managing physiological response and psychological state. But, while its effectiveness as a therapeutic medium has found support in a clinical capacity, its ability to significantly modify cognitive states is still under a great deal of scrutiny.

1.1 A Brief History of Meditation

A fundamental issue with investigating the origin of meditation is that records are often ill-kept or lost, or articles that discuss the origin of meditation are vague and provide references for articles that reference themselves in a circular manner. Additionally, religious texts don't always

provide first hand-experience or explanations as to why something occurred or where it came from. As such, most articles on the origin of meditation are typically from secondary sources and ambiguous about the precise steps taken in the activity.

Although linked to its roots in Hindu and Buddhist traditions, the word ‘meditate’ didn’t concretely manifest until the 12th century, when it was introduced by, the Carthusian monk Guigo II, in his book on Christian doctrine titled, *The Ladder of Monks (or Scala Claustralium)* (Guigo, 1978). In it, he outlines a step-by-step account of Christian spiritual enlightenment by *meditatum*, which in Latin means *to ponder*. Although meditation is often associated with eastern philosophy, the contribution of Guigo II is important to note because it indicates that meditation was not refined to a single culture or religion. Instead, it found use in a variety of groups regardless of geographical location as an activity for cultivating spirituality (Gunaratana, 2015). In the Judeo-Christian tradition, meditation comes in the form of prayer and contemplation. In the Hindu tradition, meditation is an exercise in concentration, often involving chants, religious images and visualizing spiritual energy in the body. In the Buddhist tradition, concentration is paired with awareness in order to understand the human condition and the nature of the world.

In the context of historical investigation, meditation is considered to be an activity whereby the practitioner withdraws attention from the outside world in order to train the mind to cultivate a particular state-of-being by curbing the focus of their thoughts. In some cases, the practitioner attempts to bring about a state of relaxation, focusing on components of their muscle and skeletal structure and practices ways of thinking about particular areas of the body that allows them to loosen and relax. In its religious capacity, meditation is often used to train its practitioner to nurture spiritual energy in the form of qi, ki, chi, prana or dogmatic prayer (Smith, 2014). It’s in this religious context where the oldest traces of meditation can be found.

The origin of meditation as a step-by-step practice has been associated with a number of ancient civilizations residing in the areas ranging from Southeast Asia, the Indian Peninsula and even into Mesopotamia and Northern Africa (Al Taher, 2015). Although there is a great deal of speculation as to when meditation first manifested prior to 1500 BCE, the earliest known and most commonly referenced appearance of meditation as a religious activity occurred in the Vedic

era of ancient northern India (1500 - 500 BCE), where it is first mentioned in the Vedas, an archaic body of literature on the religious practices of northern Syrian, proto-indo-European and Indic peoples. The Vedas are an authorless body of texts that deal with the practices of ancient dogmas and are broken down into a number of components outlining social ritual, sacrifices, and the worship of Indic and regional gods. In the classical period of India (800 BCE to 200 BCE), Vedic religion underwent a reformation of its religious practices and rituals, leading many researchers to conclude that it was during this period that the Hindu beliefs of Karma, reincarnation, transcendentalism and enlightenment developed (Michaels, 2004; Muesse, 2003). As Vedic practices continued to spread, its traditions would adapt to the cultures of neighboring regions, and develop into the core religions of ancient India: Hinduism, Buddhism and Jainism.

It's at this point that meditation became an activity oriented towards developing a contemplative state of mind, where practitioners would seek to *self-actualize*. In Hindu groups this focused primarily on understanding their relationship to the Gods and the world around them. Conversely, Buddhist groups were primarily concerned with reaching a state of perfect actualization and releasing the mind from earthly ties. According to Buddhist doctrine, this was done in order to achieve enlightenment or nirvana (Mahony, 1998; Wynne, 2007). Of particular interest to the current study, Vipassana is the buddhist principle of gaining insight into the nature of reality, and is the ancestral precursor to what would later become mindfulness meditation in the western world. What differentiated Vipassana from other meditation practices is that it was - and remains to be - an insight meditation that focuses on increasing sensitivity to thoughts, feelings and actions (Gunaratana, 2015).

1.2 What is Mindfulness

Although a diverse and varied activity, meditation practices can be broken down into two main methods: concentration methods and insight methods (Bogart, 1991; Goleman & Schwartz, 1976). In concentration techniques, meditation is oriented towards cultivating sustained attention. In these cases, the conscious mind focuses its attention on a particular object or activity (e.g. a mantra, breathing, spiritual energy, etc.) and attempts to curb attention away from

distractions in the environment. In insight meditation the practitioner is open to thoughts and feelings as they occur, and instead of dismissing them, attempts to understand the motivation behind why those thoughts manifested. While both activities involve a withdrawal from the physical world in an attempt to focus on subjective action, concentration and insight techniques differentiate from each other on their openness to internal motivations.

Mindfulness meditation is a subgroup of meditation descending from Buddhist insight practices that focuses on a way of withdrawing attention from the physical world in order to pay attention to the present moment with a non-judgmental attitude (Gunaratana, 2015). Like other schools of meditation, mindfulness has its roots in Buddhist philosophy where the goal is to achieve a state of enlightenment or insight into the nature of reality. However, while these practices are primarily occupied by their spiritual implications, mindfulness is a secular branch of the philosophy, that focuses on the act of the meditation for it's immediate psychological or physiological benefits, rather than on its long-term spiritual significance.

There are a number of different methods to the practice, including breathing-oriented, bodyscan-oriented, and opening monitoring. Each of the different methods involves focusing on a certain target in order to cultivate sustained attention. For example, the breathing-oriented paradigm involves continually returning your attention back to your breath and counting the length of time it takes for you to breathe in and out. However, when compared to other meditation practices, mindfulness practices are open to non-judgmental thoughts about the present moment; something not found in concentration meditations such as Zen, in which the practitioner attempts to cultivate a state of 'no-mind'. This secular attitude, with a focus on modifying cognitive states has allowed mindfulness meditation to find use in several clinically oriented-group based therapies such as mindfulness-based stress reduction, mindfulness-based cognitive therapy, dialectical behaviour therapy and acceptance and commitment therapy.

1.3 Mindfulness Research

While a great deal of claims are made about the cognitive benefits of mindfulness meditation, to date, there hasn't been a great deal of quality empirical studies into how cognition changes as a

result of mindfulness meditation experience. A certain degree of this issue is due to the illusive nature of mindfulness. It is often described with vague or interpretive language, making it difficult to operationalize (Lutz, Dunne, & Davidson, 2007). Additionally, the meditation practice structure varies based on the discretion of the instructor, the independent practitioner or the researcher (Chiesa, Calati, & Serretti, 2011; Lutz et al., 2007; Lutz, Slagter, Dunne, & Davidson, 2008). This has led to very little regulation regarding practice length, how often practice occurs, or what mindfulness meditation method was used (i.e. whether they used breathing-oriented techniques, open-monitoring techniques, mindfulness-based yoga, etc.). As such, there is very little understanding in how they differ from other techniques or what participants are specifically doing. Additionally, many of these studies used pre-existing, selected for populations and compared them to non-practitioners (Chiesa et al., 2011). For example, a Buddhist fellowship might select for certain qualities in their members. This could lead to those who did not have the attention necessary for prolonged meditation or years of isolated study to discontinue their apprenticeship. Such a population dynamic would select for people who naturally have better attention than others. Studies that use such a sample may not be testing the differences between a mindfulness and a normal population, but rather the differences between a high attention group and an average attention group. Other methodological issues in mindfulness research include studies that are observational rather than experimental in nature, use very small populations with low power, and use waiting as a comparison group or compare a mindfulness condition to a similar relaxation activity (Lutz et al., 2008). Furthermore, in an evaluative meta-analysis investigating positive trends in mindfulness research, researchers from McGill University concluded that the proportion of studies with significant results in mindfulness literature are too high, considering sample size and power of the studies, indicating an extent of publication bias (Coronado-Montoya et al., 2016).

1.3.1 Mindfulness and Well-Being

Most of the research and claims on mindfulness meditation primarily focus on its influence on personal well-being. A prominent figure in mindfulness literature, Jon Kabat-Zinn is perhaps best known for his introduction of mindfulness techniques to the clinical world. As a founder of

the Stress Reduction Clinic at the University of Massachusetts, Kabat-Zinn was able to develop and implement a mindfulness-based stress reduction (MBSR) program to help patients with stress and coping, as well as general improvements in quality of life. Since its first clinically-recognized use, mindfulness meditation has been the target of a number of studies investigating its effectiveness as a therapeutic device.

Therapist and practitioners alike make claims about the positive effect of mindfulness on immediate health and well-being, especially in its use to facilitate a state of happiness and manage anxiety (Miller, Fletcher, & Kabat-Zinn, 1995). Other groups claim that mindfulness may help relieve stress, treat heart disease, lower blood pressure, reduce chronic pain, improve sleep and even alleviate gastrointestinal difficulties (Gaylord et al., 2011; Kabat-Zinn, 2009). In a review of mindfulness literature, Davis and Hayes (2011) indicated that mindfulness-based practices seemed to have a positive influence on reduced rumination (Chambers, Lo, & Allen, 2008), stress reduction (Hofmann, Sawyer, Witt, & Oh, 2010), boosts to working memory (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010), improved focus (Moore & Malinowski, 2009), less emotional reactivity (Ortner, Kilner, & Zelazo, 2007), greater cognitive flexibility, and relationship satisfaction (Barnes, Brown, Krusemark, Campbell, & Rogge, 2007). Additionally, Davis and Hayes outlined a number of improvements in the therapists themselves, including greater perceived level of compassion (Shauna L. Shapiro, Astin, Bishop, & Cordova, 2005), counselling skills, decreased anxiety and increased empathy (S. L. Shapiro, Schwartz, & Bonner, 1998). While a great deal of research has been conducted to test its efficacy in health and well-being, research into its claims on cognition have given mixed results at best.

1.3.2 Mindfulness and Cognition

While the research on the effects of mindfulness on mental health has been extensive, the cognitive mechanisms by which mindfulness influences mental health are not well understood. Many claims are made about its efficacy in mental health and the impact of mindfulness can be broken down into a few core areas; in particular, the effects of mindfulness on stress reduction, emotional reactivity, and mood disorders. Of particular interest is its influence on rumination, a

maladaptive system of self-reflection in depression and anxiety. During rumination, a person's thoughts continue to fixate on emotional responding to events, instead of problem solving. As is often the case, those who suffer from rumination lack the ability to remove irrelevant negative information in working memory (Cohen, Mor, & Henik, 2015). However, training alone in working memory has not been seen to reduce rumination (Onraedt & Koster, 2014). It may be that attentional training in mindfulness teaches the subject to exert greater executive control over where their attention is; learning how to separate themselves from their concern and break a problem down to its local components rather than be overwhelmed by its global face-value (Cohen et al., 2015).

In a meta-analysis on cognitive research, Chiesa, Calati, and Serretti (2011) found that mindfulness was associated with improvement in selective and executive attention in the early phases of the practice, sustained attention in later phases, and general improvements in working memory and executive function. Furthermore, it was found that, in regards to selective attention, participants with meditative experience were associated with faster response time on both congruent and incongruent aligned images (Chan & Woollacott, 2007). While meditators and non-meditators alike had shorter response times on valid items when compared to invalid items, meditators showed an ability to disengage faster from invalid visual information and redirect their attention (Hodgins & Adair, 2010). It would appear that people who engage in mindfulness meditation practices are no more accurate on selective attention tasks than those that do not. However, it does seem that they may possess an ability to be able to detach from information that interferes with the task at hand, such as what may be found in a stroop interference task (Moore & Malinowski, 2009). Yet, what is not understood is whether this ability to detach can be transferred to discriminate between objects whose components share an intrinsic relationship with the global whole, such as that found in global/local tasks. What's more, it's not understood whether these effects are unique to mindfulness meditation, or whether this is a common quality among relaxation-styled activities. While the meta-analysis by Chiesa et al. (2011) thoroughly investigated mindfulness and working memory, selective attention, executive attention and sustained attention, it also demonstrated a significant gap in the literature for attentional switching between global and local tasks.

Chapter 2

2 Study One

In order to further evaluate the attentional qualities of mindfulness meditation, the current study measured the attentional preference of practitioners after a short Mindfulness intervention. Within the context of this experiment, attentional preference is considered to be the ability of the participant to respond to the localized components of an image, while being distracted their by global/peripheral characteristics. Mindfulness meditation practices involve fixating on and returning attention to a target, awareness of the components of a target, as well as disengaging from distracting stimuli. It is expected that participants in the mindfulness condition will have better performance (in both accuracy and response time) in all consistent trial types when compared to a relaxation-style activity. However, it is also expected that because mindfulness trains in a broadening of attentional resources, that participants in the mindfulness condition will be more sensitive to peripheral stimuli, and as such be more distracted by global features on tasks where the global characteristics do not match the local image. On items where the global image is inconsistent with the local image, it is hypothesized that participants trained in mindfulness meditation will be more distracted by global/peripheral characteristics. This study will make use of three attentional tasks used to measure attentional preference. In the Navon task, participants in the mindfulness condition are expected to be better able to detect and respond to the local components of an image on consistent items, but perform worse on inconsistent items. In the Flanker task, participants in the mindfulness condition are expected to be better able to detect and respond to the center facing arrow when peripheral images are consistent with the direction of the target arrow, but perform worse on items where the peripheral arrows are inconsistent with the direction of the target arrow. In the Simon task, participants are expected to perform better on images where the location of the response is consistent with the location of the target image, but worse when the location of the response is inconsistent with the location of the target image.

2.1 Methods

2.1.1 Participants

Using a pre-selected for population in mindfulness research is a concern (see section 1.3). In the current study, steps were taken in order to ensure that the type of participant who signed up had little to no experience with mindfulness meditation, and did not sign up because they had an affinity towards the practice. This way, participants would have minimal bias towards mindfulness, or meditation in general. Participants were given limited information about the nature of the study before signing up so as to avoid selection bias in the sample that agreed to participate. In order to control for the type of person that signs up for the study, the name and description of the study was left vague. The study was advertised as '*Emotion, Mood and Thinking' - an investigation into the potential impact of emotion, mood and thinking on cognitive tasks.* It was only upon arrival for their appointment that participants were made aware that the study was investigating mindfulness meditation. Seventy-one participants were recruited from the Western University Psychology Research Participation Pool and university campus. The data from six participants from the breathing condition were randomly removed during data analysis in order to avoid violating equal variance assumption.The sample was composed of 66 Participants [33 experimental (25 female), 33 control (23 female)] from the Western University Campus, and were aged 17-44 (M = 20.5 years, SD = 4.48). Of those who participated, 30 participants were recruited through the Western Psychology Research Participation Pool, and received compensation in the form of a course credit. Thirty-six participants were recruited through advertising on campus, and received compensation in the form of $10. All participants had normal, or corrected to normal, hearing and visual acuity, and spoke English as a first language. Gender, education, ethnic, meditation and religious breakdown can be found in Table 2.1.

Gender Distribution

Gender Background	Frequency	Percentage
Female	48	72.73
Male	17	25.76
Undisclosed	1	1.52

Post Secondary Year of Study Distribution

Education Background	Frequency	Percentage
First Year	31	46.97
Second Year	6	9.09
Third Year	14	21.21
Fourth Year	8	12.2
More than Four Years	3	4.55
Undisclosed	4	6.06

Ethnic Frequency

Ethnic Background	Frequency	Percentage
Arab	2	3
Black	2	3
Caucasian	34	51.5
Chinese	13	19.7
Filipino	2	3
Latin American	1	1.5
South Asian	11	16.7
West Asian	1	1.5

Meditation Experience

Meditation Background	Frequency	Percentage
No Experience	50	75.8
Mindfulness	10	15.15
Zen	5	7.58
General Meditation	1	1.52

Religious Frequency

Religious Background	Frequency	Percentage
Buddhist	1	1.5
Catholic	17	25.8
Christian otherwise not stated	6	9.1
Hindu	3	4.5
Jewish	3	4.5
Muslim	5	7.6
None	28	42.4
Protestant	3	4.5

Table 2.1. Demographic breakdown of participants.

2.1.2 Materials

With the exception of the demographic survey, all data was collected using two 2012 Mac minis' with 2.5 GHz Intel Core i5, 4gb of DDR3 ram and running an operating system on 10.12.3 Sierra. Additionally, all stimuli was presented on a 20", LED Samsung display. All computer tasks (see section 2.1.2.2, 2.1.2.3, and 2.1.2.4) were developed using the Psychopy2 open-source application (Peirce, 2002), which allowed for the use of a building graphical user interface and a coding interface, using Python programming language. All components of the demographic questionnaire were collected using a pen and paper method (see section 2.1.2.5).

2.1.2.1 Audio Clips

Both groups received a 10-minute long audio clip treatment. Both audio clips were recorded by Dr. Ruby Nadler. Dr. Nadler is the director of mindfulness training at Sigma Assessment Systems in London, Ontario. The experimental condition was given a breathing-oriented mindfulness meditation that focused on returning attention to the participant's breathing (Appendix E). In the breathing-oriented condition, participants were encouraged to pay attention to the sensation of their breath as they breathed in and out. Periodically, the narrator in the audioclip would remind participants that if their thoughts were to wonder, to gently bring their attention back to their breath, without judgement or reacting to where their thoughts were. The

control condition was given a 10 minute-audio clip of the The Hobbit, starting on the first line of the first chapter, and ending after 10 minutes (Appendix F). The Hobbit is a children's fantasy novel published by J.R.R. Tolkien in 1937, and is considered a classic in children's literature. The story is a medieval epic, set in a fantasy realm of Tolkien's own creation. The section of the book that was read to participants is - in part - the prologue of the book, and could be considered to be less exciting and more relaxing than other parts of the story. This text has been used as a control group in a heavily referenced study by (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). The choice to use an audiobook for the control task was based on the fact that it is not a pure relaxation activity and uses narration as the focus for attention.

2.1.2.2 Navon Images

The first test in the attentional battery was the Navon task (Navon, 1977). The Navon task detects visual neglect in global and local processing. In the task, participants were asked to fixate on a neutral stimulus for one second, and were then shown an image. The image was of a large letter H or large letter S composed of either smaller letter Ss or smaller letter Hs (see Figure 2.1).

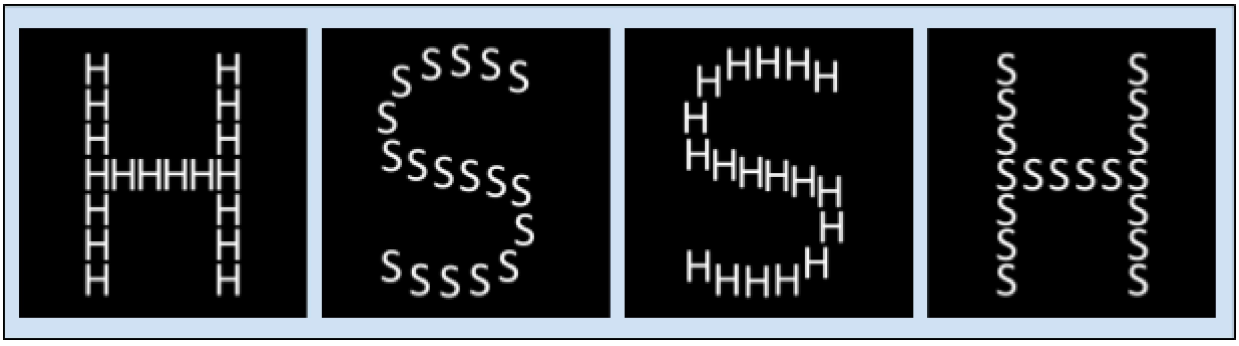

Figure 2.1. Navon Images: each image was of a global H or S, composed of local Hs or Ss.

The participants were asked to indicate what letter was the large letter composed of (i.e. if the large H was composed of smaller Hs or smaller Ss). A global focus results in an increased response latency when the global and local features are inconsistent with each other (i.e. a large letter H made up of smaller letter Ss). This occurs because the global features interfere with local processing. Participants viewed a neutral stimuli for one second, followed by the target image (H

or S) for 200 ms, and then had up to seven seconds to indicate whether the target image was composed of smaller Hs or smaller Ss. This test involved a short practice period of 16 images where participants received feedback on their choices, followed immediately by the full test. During the full trial, participants viewed 32 images (16 consistent, 16 inconsistent) and were measured for their accuracy and response time on correct consistent and inconsistent trials.

2.1.2.3 Flanker Images

For the second test in the attentional battery, participants completed the Flanker Task. The Flanker task was developed in order to study the processes involved with recognizing a target stimuli while being distracted by visual information or noise (Eriksen & Eriksen, 1974). In it, participants were shown a row of five arrows and asked to identify which direction the center arrow is pointing. Participants fixated on a neutral stimulus for one second, were presented with a target image for 200 ms, then asked to indicate which direction the center arrow was facing. In the Flanker task participants would encounter either consistent-oriented images, inconsistent-oriented images, or a neutral-oriented images (see Figure 2.2). In the consistent-oriented images, the center arrow in the image was facing the same direction as the peripheral arrows found on the screen. In the inconsistent-oriented images, the center arrow was facing the opposite direction of the peripheral arrows. In the neutrally-oriented images, the arrows on either side of the center arrow were replaced with blank boxes.

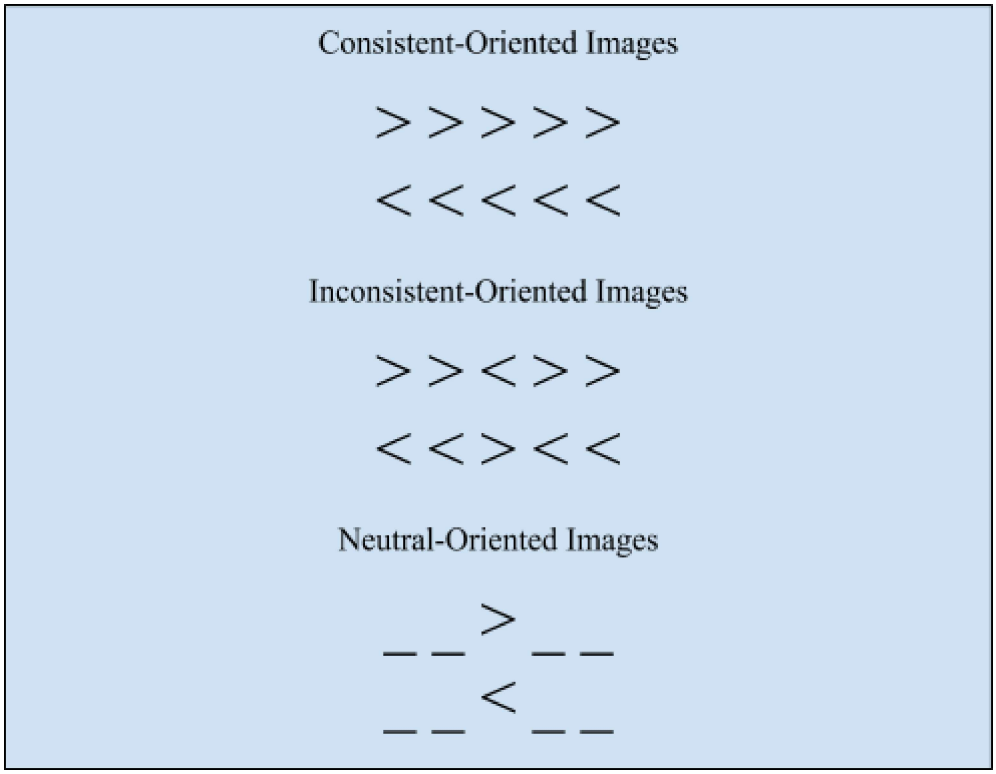

Figure 2.2. Flanker Consistent, Inconsistent and Neutral images.

Each of the three dimensions randomly switched between the center arrow facing left, and the center arrow facing right. This test involved a short practice period of 12 images where participants received feedback on their choices, followed immediately by the full test. During the full trial, participants viewed 24 images (8 consistent, 8 inconsistent, and 8 neutral) and were measured for their accuracy and response time on correct consistent trials, inconsistent trials, and neutral trials.

2.1.2.4 Simon Images

For the third test in the attentional battery, participants completed a variation on the Simon task, as described by Hedge and Marsh (1975). For the purpose of the current study, the Simon task measured the reaction time of participants when an image was presented in the same perceptual area as the response and was compared to when it was in the opposite location of the response. In it, participants were shown one of two different coloured balls (red or green) on a screen and asked to indicate what colour the ball was. Their responses were measured on one of two

coloured buttons (red or green) that corresponded to the colours of the balls, with each hand controlling one of the buttons. As an image appeared on the screen participants would press the button that was the same colour as the ball that appeared. However, the ball would change locations on the screen each time it appeared, sometimes appearing over the same coloured response button and other times appearing over the opposite coloured response button (see Figure 2.3).

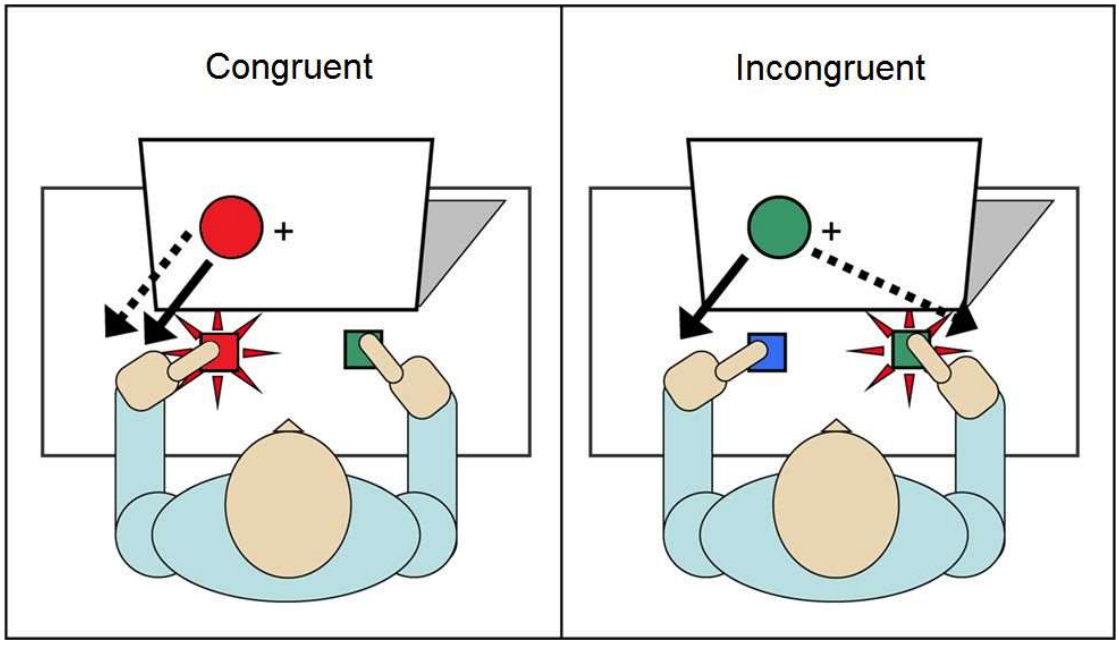

Figure 2.3. Simon task based on Hedge and Marsh's modified Simon task ("The Hedge and Marsh Task," 2012).

Accuracy and response time was measured on trials where the image appeared on the same side of the screen as the button, and when the image was on the opposite side of the screen (inconsistent with the location of the button). This test involved a short practice period of 16 images where participants received feedback on their choices, followed immediately by the full test. During the full trial, participants viewed 32 images (16 consistent, 16 inconsistent) and were measured for their accuracy and response time on correct consistent and inconsistent trials.

2.1.2.5 Demographic Questionnaire

In addition to completing the attentional battery tasks (2.1.2.2, 2.1.2.3, and 2.1.2.4), participants were also asked to complete a nine-page demographic survey (See Appendix C). On it, participants were asked to provide their gender, age, ethnic background, religious affiliation and experience with mindfulness meditation or similar meditation practices (e.g. yoga, tai chi, etc.). Additionally, participants also completed a Positive and Negative Affect Schedule questionnaire (PANAS) and a Kentucky Inventory of Mindfulness Skills questionnaire (KIMS). Finally, participants were asked to provide information regarding how successful they were at listening to the audio, and whether they were able to follow instructions. It was expected that a difference in groups on the PANAS and KIMS questionnaires would be indicative of an effect of mindfulness.

2.1.2.5.1 PANAS Questionnaire

The Positive and Negative Affect Schedule (PANAS) questionnaire is a twenty-item questionnaire that measures the positive and negative affect of the participant (Watson, Clark, & Tellegen, 1988). In it, participants are presented with a list of words that describe different feelings and emotions. They are then asked to indicate to what extent each of the words applies to themselves at the present moment using a five-point Likert scale ranging from 1 (very slightly or not at all) to 5 (extremely). For example, a participant might be presented with the word '*interested'*. If the participant is not feeling interested at the current moment, then they may write the number 1 next to it. Each word is oriented towards either a negative or positive affect. All scores that are allocated towards positively-oriented words are added up to give a positive affect score with a score ranging from 10 to 50. The higher the score, the higher the levels of perceived positive affect. All scores that are allocated towards negatively-oriented words are added up to give a negative affect score, and range from 10 to 50. The higher the score, the higher the levels of perceived negative affect. The PANAS questionnaire is a fairly common test of positive and negative affect in the psychological community and has fairly strong reliability and validity, as reported by Watson (1988). Internal consistency using Cronbach's alpha was rated .86-.90 for

positive affect and .84-.87 for negative affect. Other studies investigating meditation have used the PANAS questionnaire as a measure of positive and negative affect (Fabbro, Crescentini, Matiz, Clarici, & Fabbro, 2017; Keune & Perczel Forintos, 2010). It was expected that if an effect of mindfulness had occurred, a slight increase in positive affect and decrease in negative affect would have appeared.

2.1.2.5.2 KIMS Questionnaire

The Kentucky Inventory of Mindfulness Skills (KIMS) is a 39-item inventory that measures a participant's level of mindfulness based on four subscales: Observing, Describing, Acting with Awareness, and Accept without Judgment (Baer, Smith, & Allen, 2004). In it, participants are presented with a list of statements about themselves. They are then asked to indicate to what extent each of the words applies to themselves using a five-point Likert scale ranging from 1 (never or very rarely) to 5 (very often or always true). For example, statement one says “I notice changes in my body, such as whether my breathing slows down or speeds up”. If a participant believes this statement to be nearly always true, they would then write the number 5 next to the item. In scoring, each statement is oriented towards one of the four subscales and is composed of both normal and reverse-coded items. The scores of each statement are then added up according to the subscale they belong to, and the four values of mindfulness are then collected. The subscales are broken down into Observing, Describing, Acting with Awareness and Acceptance without Judgements. Observing responds to the ability to notice or attend to various internal and external stimuli. Describing responds to the ability to use non-judgemental words to describe or label stimuli. Acting with Awareness responds to being engaged in the current moment. Acceptance without Judgements responds to the ability to acknowledge stimuli without judging, avoiding or reacting to it. The KIMS is considered to have good internal consistency for Observing (.91), Describing (.84), Acting with Awareness (.76) and Acting without Judgments (.87). Additionally, the KIMS has adequate test-retest reliability for Observing (.65), Describing (.81), Acting with awareness (.86) and Acceptance without judgments (.83) (Baer et al., 2004).

2.1.3 Procedure

Participants were randomly assigned to one of two treatment groups before they arrived at the lab. Participants were run in groups of two in the lab's testing facility. After reading the letter of information (Appendix A), participants provided informed consent (Appendix B) and were given a brief verbal explanation of the study procedures (Appendix D). Participants were informed that they would listen to an audio-clip for ten minutes and then complete a set of attentional tasks, followed by a questionnaire packet. Instructions for each of the tasks was provided on the computer screen before each test, and participants were given a quick practice trial with feedback before each attentional test. If participants had been randomly assigned to the experimental condition (n=33), they would listen to a 10-minute breathing-oriented mindfulness meditation that focused on returning attention to the participant's breathing. In the breathing-oriented condition, participants were encouraged to pay attention to the sensation of their breath as they breathed in and out. Periodically, the narrator in the audioclip would remind participants that if their thoughts were to wonder, to gently bring their attention back to their breath, without judgement or reacting to what their thoughts were. If participants had been randomly assigned to the control condition (n = 33), they would listen to a 10-minute-long audio clip from the first chapter of The Hobbit. After the audio clip had finished, participants were presented with the attentional tasks (see section 3.1.2.2, 3.1.2.3, and 3.1.2.4). Participants viewed a neutral stimuli for one second, followed by the target image for 200 ms, and then had up to seven seconds to indicate what the correct target image was, though they were asked to respond as quickly as possible (see Figure 2.4).

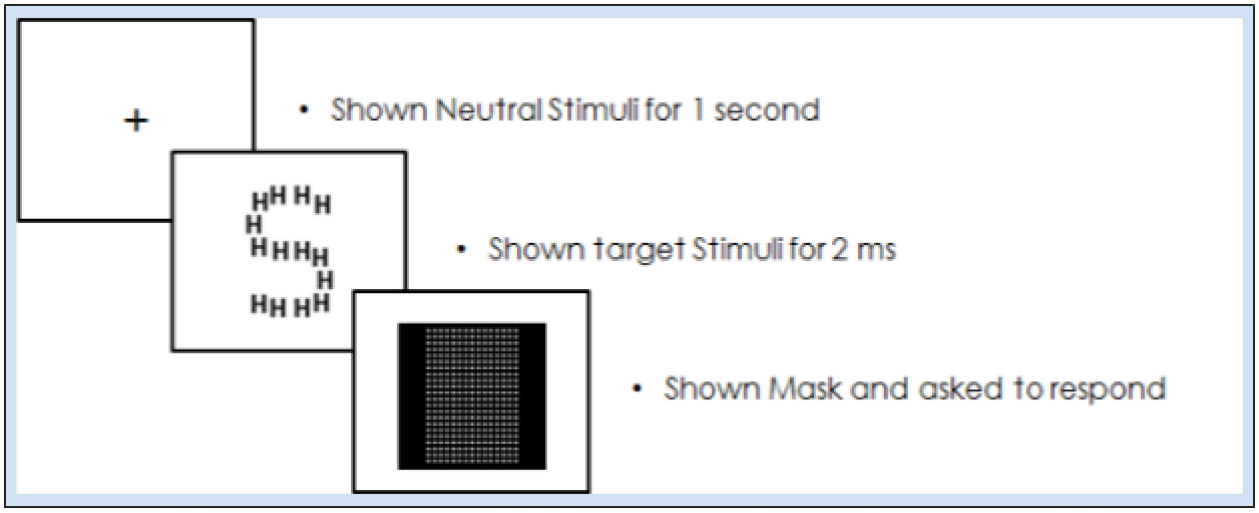

Figure 2.4. Visualization of how the attentional battery tasks were administered. This is an example an inconsistent Navon trial where participants indicated what the local features of the image were. If correctly responding, participants would indicate that the local images were Hs.

Following the completion of the attentional tasks, participants completed a follow-up pen and paper demographic survey (2.1.2.5), as well as the PANAS (2.1.2.5.1), and KIMS (2.1.2.5.2) questionnaires. Participants were allowed to ask any questions that they may have had concerning the nature of the study, and then thanked for their time and given compensation (see 2.1.1).

2.2 Results

Proportion of correct items, and response time, on consistent and inconsistent trials was compared between the treatment and control conditions on the Navon, Flanker, and the Simon tasks. Results were calculated using R studio with the EZ ANOVA package. Preliminary data analysis was conducted on jamovi (Love, Dropmann, & Selker, 2016) software. A main effect of trial type (consistent and inconsistent) was found in most tests. No main effects of condition or interaction of condition by trial type were found. All values are rounded to the nearest thousandths.

2.2.1 Navon Data

Reaction time data included no zero response time of consistent and inconsistent trials. Three subjects were removed from both the mindful condition (23B,63B,67B) and the control condition (26H,62H,68H) because they had a response time of zero for inconsistent items. As they did not make any correct responses for inconsistent items, their data was removed in order to not skew group means. A 2x2 mixed effects analysis of variance (ANOVA) was conducted for response time with consistent and inconsistent trial type as within-groups factors and condition (mindfulness and control) as a between-group factor. A main effect of condition was not observed; $F(1, 58) = 1.148$, $p = 0.702$. A significant main effect of trial type was found; $F(1,58) = 20.523$, $p < 0.001$. However, a post-hoc Bonferroni adjustment indicated no difference in response time on consistent and inconsistent trials ($p = 0.062$). An interaction effect of condition by trial type was not observed; $F(1,58) = 0.088$, $p = 0.768$. See Figure 2.5,

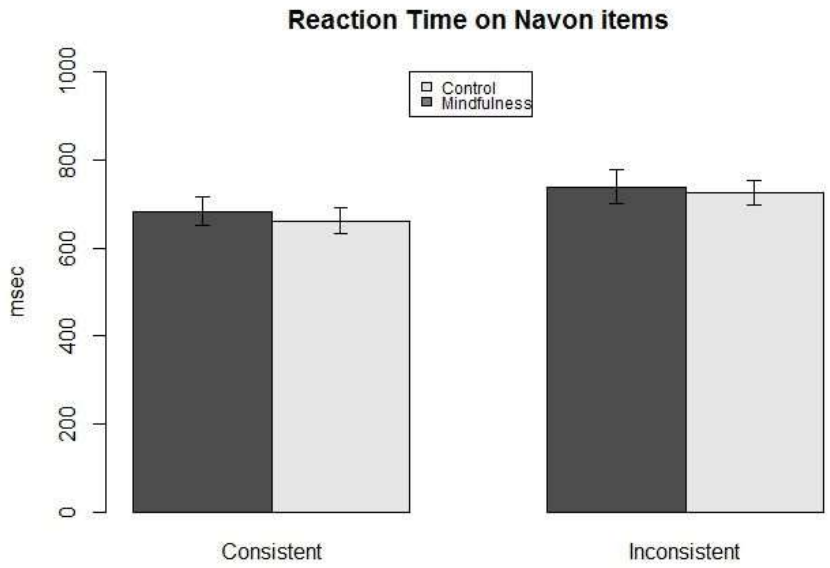

Figure 2.5. Reaction Time of control and mindfulness groups on consistent and inconsistent Navon trials. Error bars are Standard Error of the Mean (SEM).

A 2x2 mixed effects ANOVA was conducted for accuracy (i.e. proportion correct) with consistent and inconsistent trial type as within-groups factors and condition as a between-group factor. A main effect of condition was not observed; $F(1, 58) = 0.006$, $p = 0.94$. A significant main effect of trial type was found; $F(1,58) = 13.83$, $p < 0.001$. A post hoc Bonferroni adjustment indicated a significant difference in accuracy on consistent and inconsistent trials ($p < 0.001$). An interaction effect of condition by trial type was not observed; $F(1,58) = 0.03$, $p = 0.864$. See Figure 2.6,

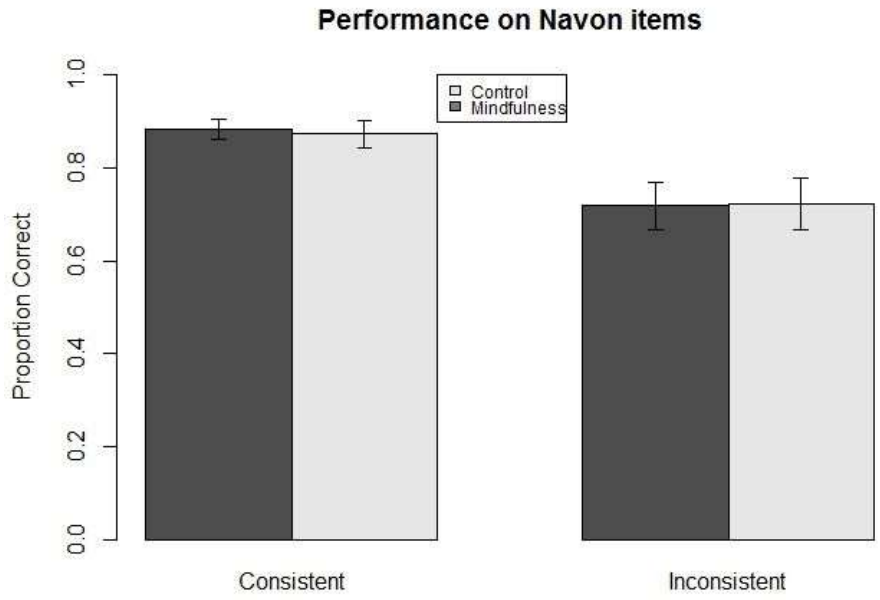

Figure 2.6. Accuracy of control and mindfulness groups on consistent and inconsistent Navon trials. Error bars are Standard Error of the Mean (SEM).

2.2.2 Flanker Data

Reaction time data included no zero response times of consistent and inconsistent trials. One subject (15B) was removed from the mindful condition because they had a response time of zero for inconsistent items. As they did not make any correct responses for inconsistent items, their

data was removed in order to not skew group means. A 2x2 mixed effects ANOVA was conducted for response time with consistent and inconsistent trial type as within-groups factors and condition as a between-group factor. A main effect of condition was not observed; $F(1, 63) = 0.139$, $p = 0.711$. A significant main effect of trial type was found; $F(1,63) = 16.399$, $p < 0.001$. A Bonferroni adjustment indicated a significant difference in response time on consistent and inconsistent trials ($p = 0.003$). An interaction effect of condition by trial type was not observed; $F(1,63) = 1.412$, $p = 0.239$. See Figure 2.7,

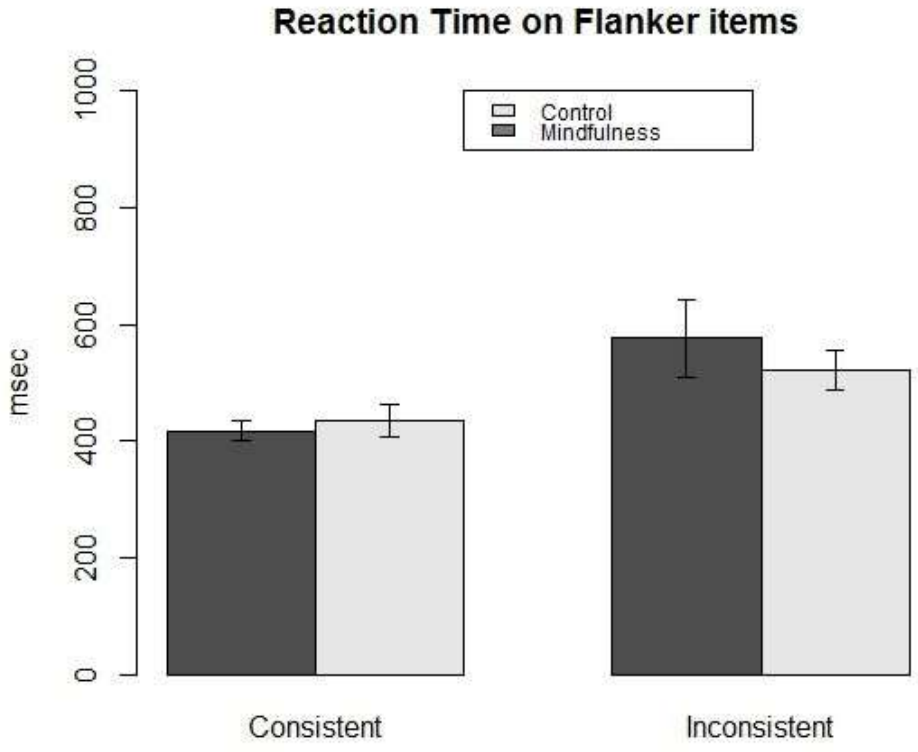

Figure 2.7. Reaction Time of control and mindfulness groups on consistent and inconsistent Flanker trials. Error bars are Standard Error of the Mean (SEM).

A 2x2 mixed effects ANOVA was conducted for accuracy with consistent and inconsistent trial type as within-groups factors and condition as a between-group factor. A main effect of

condition was not observed; $F(1, 63) = 0.985$, $p = 0.325$. A significant main effect of trial type was found; $F(1,63) = 42.183$, $p < 0.001$. A post-hoc Bonferroni adjustment indicated a significant difference in accuracy on consistent and inconsistent trials ($p < 0.001$). An interaction effect of condition by trial type was not observed; $F(1,63) = 1.587$, $p = 0.212$. See Figure 2.8,

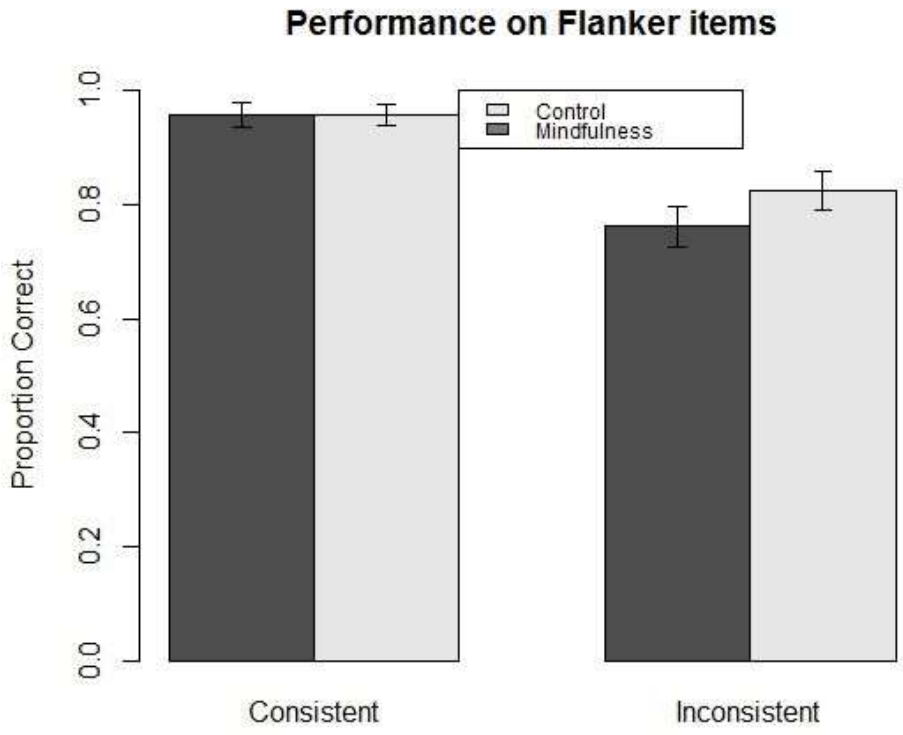

Figure 2.8. Accuracy of control and mindfulness groups on consistent and inconsistent Flanker trials. Error bars are Standard Error of the Mean (SEM).

2.2.3 Simon Data

A 2x2 mixed effects ANOVA was conducted for response time with consistent and inconsistent trial type as within-groups factors and condition as a between-group factor. A main effect of condition was not observed; $F(1, 64) = 0.17$, $p = 0.682$. A significant main effect of trial type was found; $F(1,64) = 7.576$, $p = 0.008$. A post-hoc Bonferroni adjustment indicated no difference

in response time on consistent and inconsistent trials ($p = 0.09$). An interaction effect of condition by trial type was not observed; $F(1,64) = 0.469$, $p = 0.496$. See Figure 2.9,

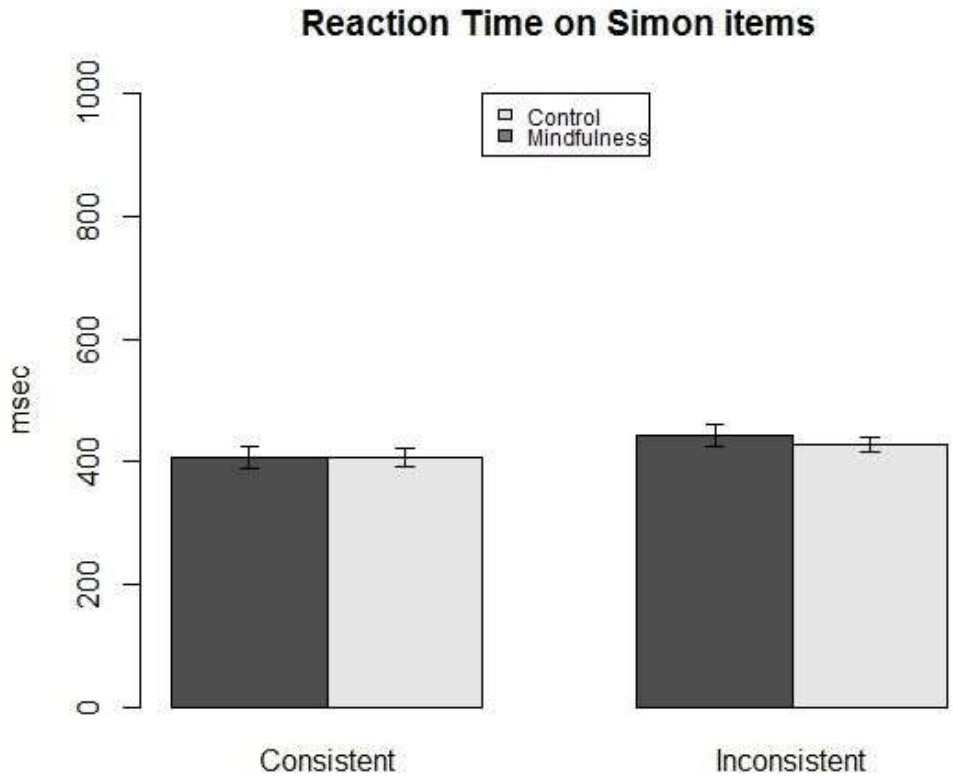

Figure 2.9. Reaction Time of control and mindfulness groups on consistent and inconsistent Simon trials. Error bars are Standard Error of the Mean (SEM).

A 2x2 mixed effects ANOVA was conducted for accuracy with consistent and inconsistent trial type as within-groups factors and condition as a between-group factor. A main effect of condition was not observed; $F(1, 64) = 0.029$, $p = 0.865$. A significant main effect of trial type was found; $F(1,64) = 23.975$, $p < 0.001$. A post-hoc Bonferroni adjustment indicated a significant difference in accuracy on consistent and inconsistent trials ($p < 0.001$). An interaction effect of condition by trial type was not observed; $F(1,64) = 1.397$, $p = 0.242$. See Figure 2.10,

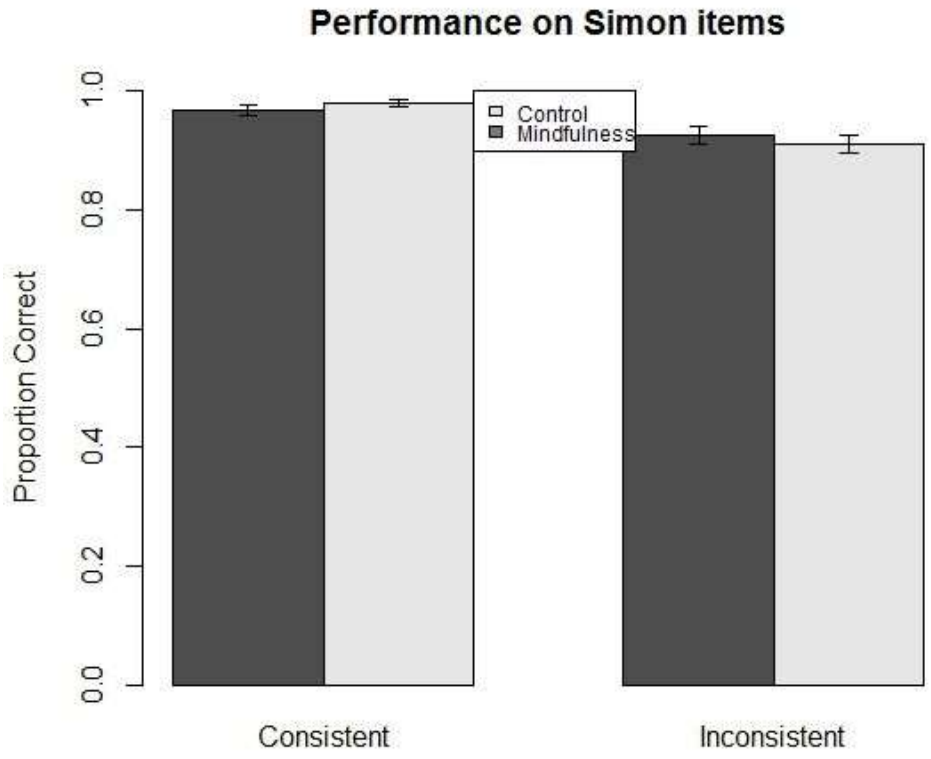

Figure 2.10. Accuracy of control and mindfulness groups on consistent and inconsistent Simon trials. Error bars are Standard Error of the Mean (SEM).

2.2.4 Positive and Negative Affect Schedule

A 2x2 mixed effects ANOVA was conducted for affect level with data type (positive and negative affect) as within-groups factors and condition type (mindfulness and control) as a between-group factor. A main effect of condition was not observed; $F(1, 64) = 7.73$, $p = 0.193$. A significant main effect of data type was found; $F(1,64) = 144.403$, $p < 0.001$, $\eta^2 = 0.483$. A Bonferroni adjustment indicated a significant difference in affect level on consistent and inconsistent trials ($p < 0.001$). An interaction effect of condition by trial type was not observed; $F(1,64) = 0.054$, $p = 0.817$. See Figure 2.11,

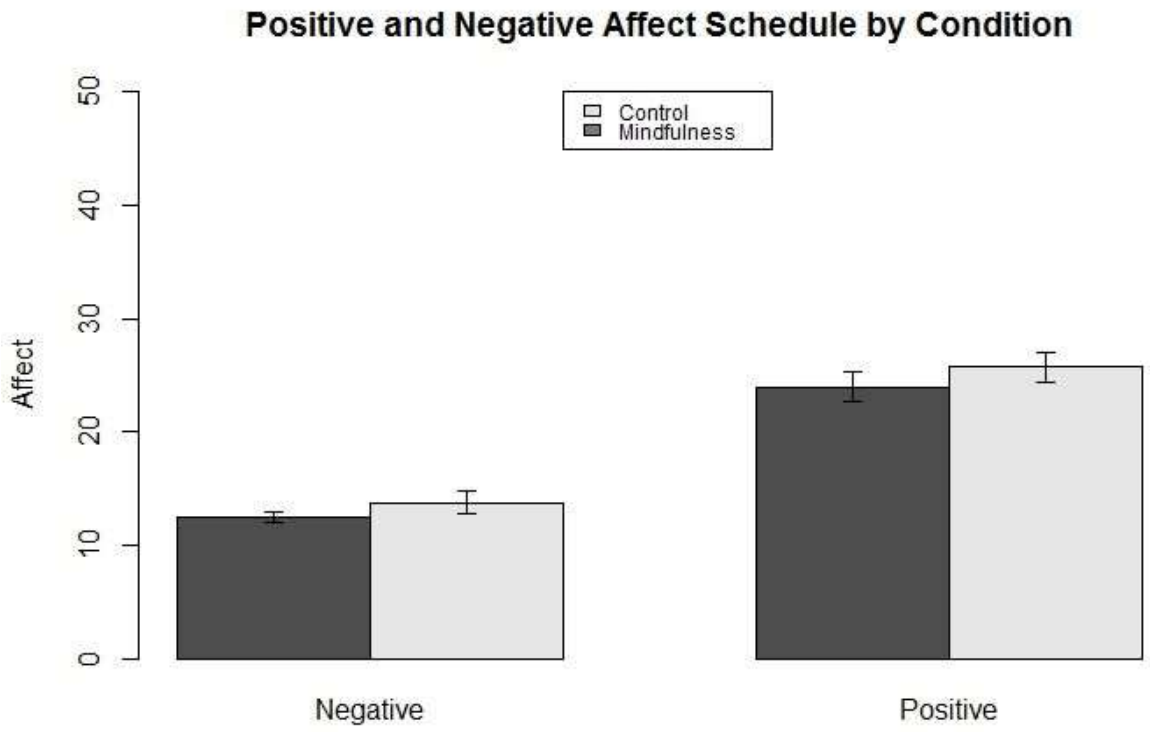

Figure 2.11. Levels of Affect between Mindfulness and Control groups on the PANAS scale. Error bars are Standard Error of the Mean (SEM).

2.2.5 Kentucky Inventory of Mindfulness Skills

A 2x4 mixed effects ANOVA was conducted for level of mindfulness skill with data type (acceptance, awareness, describe and observe) as within-groups factors and condition type (mindfulness and control) as a between-group factor. A main effect of condition was not observed; $F(1, 64) = 0.159$, $p = 0.691$. A significant main effect of data type (acceptance, awareness, describe and observe) was found; $F(3,192) = 78.323$, $p < 0.001$, $\eta^2 = 0.414$. A Bonferroni adjustment indicated a significant difference in level of mindfulness skill on observe and acceptance ($p < 0.001$), observe with awareness ($p < 0.001$), and observe and describe (p 0.001). An interaction effect of condition by trial type was not observed; $F(1,64) = 0.058$, $p =$ 0.817. See Figure 2.12,

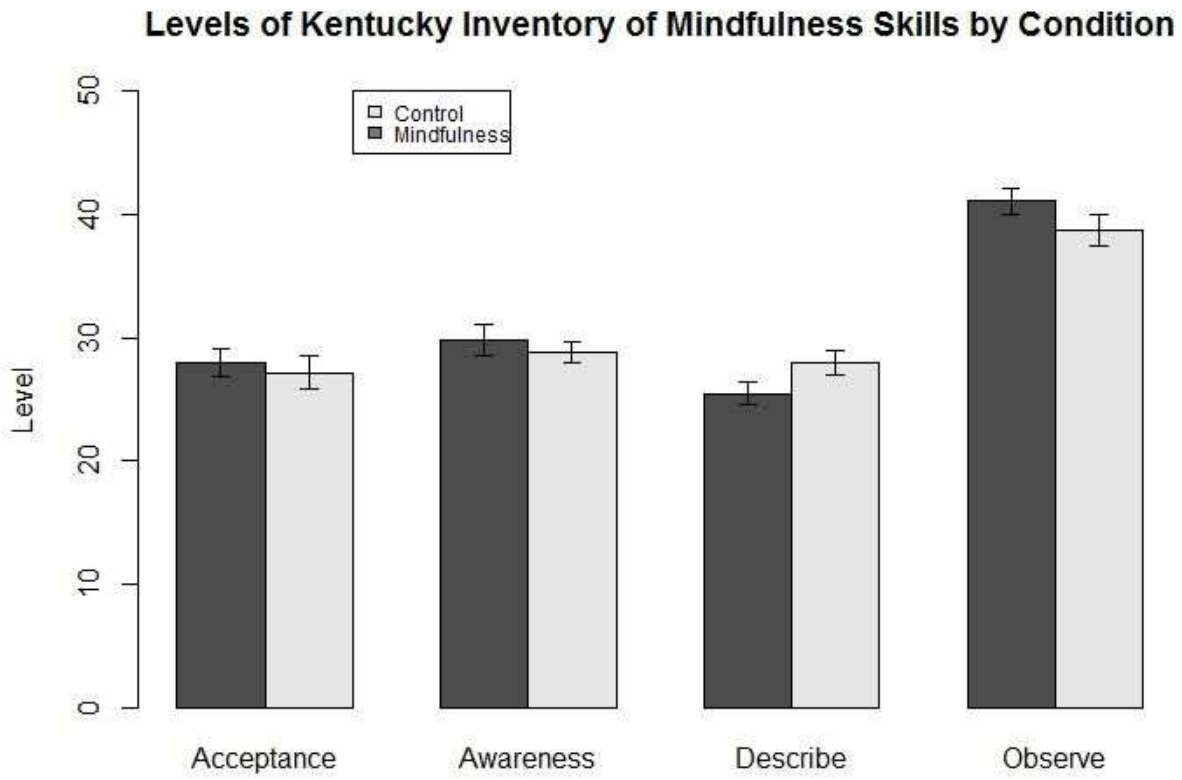

Figure 2.12. Levels of mindfulness skill between mindfulness and control groups on KIMS. Error bars are Standard Error of the Mean (SEM).

A one way student t test comparing the mindfulness group to the control group was conducted for both describe skills and observe skills. No significant difference was found on describe [$t(64) = -1.41$, $p = 0.163$] and observe [$t(64) = 1.80$, $p = 0.076$] skills.

2.3 Discussion

All three attentional tasks failed to distinguish a difference between the experimental mindfulness group and the control audiobook group. Both groups showed a trend towards better performance on consistent items over inconsistent items, and showed higher positive affect than negative affect. Unfortunately, there was no indication that participants exposed to mindfulness meditation had significantly stronger performance on consistent items, and worse performance on inconsistent items, when compared to the control condition. While it is possible that there is simply no difference between a ten-minute mindfulness intervention and a ten-minute audiobook 'intervention', there are also a number of explanations as to why we did not see an effect of mindfulness. For instance, it could be that a 10-minute mindfulness intervention is simply not salient enough to have an immediate impact on attentional preference. In other words, it could be that our treatment condition was not exposed to the stimulus long enough to have been affected by it. Based on the results found in section 2.2.5, this seems to indicate that this is the case. There was no significant difference between the treatment and control conditions on the PANAS and KIMS questionnaires. This indicates that there was no effect of treatment when the treatment condition was compared to the control condition. In much of the literature, participants in the experimental condition either engage in a mindfulness workshop or are part of a pre-existing sample of mindfulness practitioners, with experience ranging from a few weeks to a few years (Chiesa et al., 2011). As such, it may be that our experimental stimuli either needed to be longer (greater than 10 minutes) or that it needed to be exposed to participants longitudinally (over the course of several days or weeks) in order to train the participants in a manner similar to those who are trained in other studies.

Additionally, it is also possible that our tests were simply not sensitive or tough enough. Participants only went through 88 images total across all three tests (not including the brief practice trials). As a result of this, it is possible that an incredibly high or low outlier value could bias the data. Furthermore, performance in both conditions was very high in the Flanker and

Simon task. It's possible that those tests were not tough enough for participants and future studies should try and make these more difficult.

Finally, by not using a baseline control, what we analysed did not agree or correspond precisely with our research question. The task did not actually determine whether mindfulness has a measurable and significant effect on our attentional preference, it measured whether it had a greater impact than a comparable relaxation technique (i.e. reading a book).

Chapter 3

3 Experiment Two

Study one indicated that there was no difference in attentional preference when participants were either listening to a mindfulness meditation treatment or an audiobook. However, three main issues were raised: the salience of the treatment, the sensitivity of the tests and the theoretical framework. It is possible that the treatment condition (the guided meditation) was simply not strong enough in order to have an effect on the participant's cognition. Many practitioners of mindfulness engage in the activity habitually. As a result, these practitioners have had longer exposure to the treatment, which may be conducive in creating more salient cognitive effects. In study one, the experimental condition was exposed to the treatment for only ten minutes. Thus, it may have been that the ten minute guided-meditation was not strong enough to have an effect. Additionally, performance in both the control and treatment conditions was exceedingly high. It may have been possible that these tasks were simply not long or tough enough in order to control for extreme scores that may bias the data. Finally, it was possible that the researchers made a mistake in their study design, as study one compared a mindfulness meditation condition to an audiobook condition, rather than to a baseline control condition. Thus, it was not actually determined whether mindfulness meditation had an impact on attentional preference when compared to an unexposed population. However, the nearness of significant results in the Flanker and Navon tasks from study one does seem to indicate the possibility of a relationship between mindfulness and attentional preference.

The second study sought to alleviate these concerns and build upon the results of study one. In the second study, a random set of new participants was asked to complete a similar task to experiment one, with three exceptions. First, the audiobook control condition from experiment one was replaced with a baseline control condition. In this case, participants in the control condition were asked to not engage in any treatment in regards to this study (i.e. meditation). This was done in order to further investigate the impact that mindfulness meditation practices

may have when compared to a population unexposed to mindfulness. Second, participants were asked to practice meditating each day for one week, rather than for a single 10 minute session. Participants were asked to come into the lab on the first and seventh day of the study for an initial and final reading. Those participants in the mindfulness condition were asked to complete a breathing-oriented mindfulness meditation once a day for 10 minutes over the course of seven days. Participants in the control condition were instructed go about their week as they typically would. Third, because of its lack of sensitivity the Simon task was completely removed. Instead, the number of images in the Navon task and the Flanker task was increased to 64, and 60 images - respectively. In doing so, the impact of extreme scores was diminished.

3.1 Methods

3.1.1 Participants

Just as with study one (see 2.1.1), participants were given limited information about the nature of the study before signing up so as to avoid selection bias in the sample that signed up for the study. The study was advertised as '*Emotion, Mood and Thinking' - an investigation into the potential impact of emotion, mood and thinking on cognitive tasks over seven days.* It was only upon arrival for their appointment that participants were made aware that the study was investigating mindfulness meditation. Fifty-eight participants were recruited from the Western University Psychology Research Participation Pool and received course credit for their participation in the study. The data from eleven participants was later removed during data analysis: one participant left before their second session, another experienced an issue in response recording and nine participants failed to correctly complete the attentional tasks, questionnaires or treatment. The final sample was composed of 47 participants, aged 18-41 (M = 18.9, SD = 3.37). All participants had normal, or corrected to normal, hearing and visual acuity, and spoke English as a first language. Gender, education, ethnic, meditation and religious breakdown can be found in Table 3.1.

Gender Distribution

Gender Background	Frequency	Percentage
Female	19	40.4
Male	28	59.6

Post Secondary Year of Study Distribution

Education Background	Frequency	Percentage
First Year	41	87.23
Second Year	3	6.38
Third Year	0	0
Fourth Year	1	2.13
Undisclosed	2	4.26

Ethnic Frequency

Ethnic Background	Frequency	Percentage
Arab	2	4.26
Black	1	2.13
Caucasian	23	48.94
Caucasian, Aboriginal	1	2.13
Caucasian, Arab	1	2.13
Caucasian, Chinese	1	2.13
Caucasian, Filipino	1	2.13
Chinese	5	10.64
Korean	1	2.13
South Asian	9	19.15
Other	1	2.13

Meditation Experience

Meditation Background	Frequency	Percentage
No Experience	37	78.7
Mindfulness	4	8.52
Loving-Kindness	2	4.26
Zen	3	6.38
Other	1	2.14

Religious Frequency

Religious Background	Frequency	Percentage
Buddhist	1	2.13
Catholic	10	21.28
Christian Orthodox	1	2.13
Christian otherwise not stated	4	8.51
Hindu	2	4.23
Jewish	3	6.38
Muslim	8	17.02
None	17	36.17
Sikh	1	2.13

Table 3.1. Demographic breakdown of participants.

3.1.2 Materials

The similar nature of study one and study two allowed for much of the materials from study one to be incorporated into study two with a few changes (see 2.1.2). Participants were tested in groups of up to four on the two Mac Minis', as well as two additional testing workstations (2 PCs with 2.66 GHz Intel Core 2, 4gb ram, and a Windows 7 operating system, and a 20" LED Samsung display). All tests were developed on Psychopy2 software (Peirce, 2002) and were identical to the first study, with the exception that the Simon task was removed and the number of images in the Navon and Flanker tasks were increased.

3.1.2.1 Audio Clip

Only the experimental group received a 10-minute long audio clip treatment (Appendix E). which was identical to the breathing-oriented guided meditation used in study one (2.1.2.1).

3.1.2.2 Navon Images

The composition and nature of the Navon task in study two is identical to those found in study one (see 2.1.2.2). However, several developments in study two led to some changes in the Navon task. As with the test in study one, this test involved a short practice period of 16 images where participants received feedback on their choices, followed immediately by the full test. However,

during the full trial of the test participants viewed 64 images (32 consistent, 32 inconsistent) instead of the 32 images that were used in study one. Participants were again measured for their accuracy and response time on correct consistent and inconsistent trials.

3.1.2.3 Flanker Images

The composition and nature of the Flanker task in study two is identical to those found in study one (see 2.1.2.3). As with the test in study one, this test involved a short practice period of 12 images where participants received feedback on their choices, followed immediately by the full test. However, during the full trial of the test participants viewed 60 images (20 consistent, 20 inconsistent, and 20 neutral) instead of the 24 images that were used in study one. Participants were again measured for their accuracy and response time on correct consistent and inconsistent trials.

3.1.2.4 Demographic Questionnaire

As with study one, participants were asked to complete a similar nine-page demographic survey following the completion of the attentional tasks on both day one and day seven of the study (See Appendix J). The demographic survey differed from the one offered in study one only in that it asked participants to indicate how often they were able to meditate throughout the week.

3.1.3 Procedure

Participants were randomly assigned to one of two treatment groups before they arrived at the lab. Participants were run in groups of up to four in the lab's testing facility. After reading the letter of information, participants provided informed consent (Appendix B) and were given a brief verbal explanation of the study procedures and what would be expected of them throughout the week (Appendix I). Participants in the control condition signed a different letter of information (Appendix G) than those in the treatment condition (Appendix H) in order to reflect the different tasks asked of them. Instructions for each of the tasks was provided on the computer screen before each attentional test, and participants were given a quick practice trial with

feedback before each one. If participants had been randomly assigned to the experimental condition (n=24), they would listen to 10-minute breathing-oriented mindfulness meditation that focused on returning attention to the participant's breathing. In the breathing-oriented condition, participants were encouraged to pay attention to the sensation of their breath as they breathed in and out. Periodically, the narrator in the audioclip would remind participants that if their thoughts were to wonder, to gently bring their attention back to their breath, without judgement or reacting to what their thoughts were. After the audio clip had finished, participants were presented with the attentional tasks (see section 3.1.2.2 and 3.1.2.3). If participants had been randomly assigned to the control condition (n = 23) they would listen to no audio and engage in no meditative activities. Instead, participants in the control condition would directly begin the attentional tasks . Following the completion of the attentional tasks, participants completed a follow-up pen and paper demographic survey (3.1.2.4), as well as the PANAS (2.1.2.5.1) and KIMS (2.1.2.5.2) questionnaires.

Participants were required to come into the lab on the first and seventh day of the study. Those participants in the experimental group were provided a copy of the guided mindfulness meditation audio, and were asked to listen to the audioclip once per day over the course of the week. Additionally, they were instructed to set a repeating alarm throughout the week to remind themselves to listen to the audio clip and to not schedule their audio session before bed, or when in an easily distracted environment (e.g. at a family gathering, in a public space, etc.). Participants in the control condition were not provided an audio clip, and received no treatment. On day one of the study both groups of participants scheduled a time to return for their second session, a week from then.

On day seven, participants returned for their second session. During the return visit participants repeated the same procedures as the first session. Participants in the experimental group listened to the mindfulness audio clip and then completed the Navon and Flanker attentional tasks. Participants in the control group began the attentional tasks with no treatment. Both groups of participants completed the demographic questionnaire a second time. After completion of the second session, participants were encouraged to ask any questions that they might have about the

subject matter, and then thanked for their time and were granted course credit for completion of the study (Appendix G and Appendix H, Part 9).

3.2 Results

Proportion of correct items, and response time, at time 1 and time 2 were compared on consistent and inconsistent trials between the treatment and control conditions on the Navon and Flanker tasks. Results were calculated using jamovi (Love et al., 2016) software. Graphs were made using Rstudio. A main effect of time was infrequently found in each test. A significant main effect of condition was found in the inconsistent Flanker data. A significant interaction of condition by trial type was found in consistent Navon data, as well as the neutral Flanker data. All values are rounded to the nearest thousandths.

3.2.1 Navon Data

3.2.1.1 Consistent Items

A repeated measures ANOVA was conducted for accuracy (i.e. proportion correct) on consistent items with time as a within-groups factor and condition (mindfulness or control) as a between-group factor. Although approaching significance, a main effect of condition was not observed; $F(1, 45) = 2.12$, $p = 0.153$. Additionally, a main effect of time was not observed, but did seem to be approaching significance; $F(1, 45) = 1.77$, $p = 0.190$. An interaction effect of condition and time was seen; $F(1, 45) = 5.52$, $p = 0.023$; $\eta^2 = 0.106$. A post-hoc Bonferroni adjustment nearly indicated a significant difference between Time 1 and Time 2 in the mindfulness conditions; $t(45) = -2.630$, $p = 0.055$. Additionally, the Bonferroni post hoc adjustment nearly revealed a trend towards significant difference between the Control and Mindfulness conditions at Time 2; $t(45) = -2.274$, $p = 0.113$. However, effects were not significant. See Figure 3.1.

A repeated measures ANOVA was conducted for reaction time on consistent items with time as a within-groups factor and condition as a between-group factor. A main effect of condition was

not observed; F(1, 45) = 1.24, p = 0.271. A main effect of time was observed; F (1, 45) = 11.899, p = 0.001, η^2 = 0.209. A Bonferroni post hoc adjustment indicated a significant difference in both groups between Time 1 and Time 2; t(45) = 3.45, p = 0.001. An interaction effect of condition and time was not seen; F(1, 45) = 0.0773, p = 0.782. See figure 3.1,

A. B.

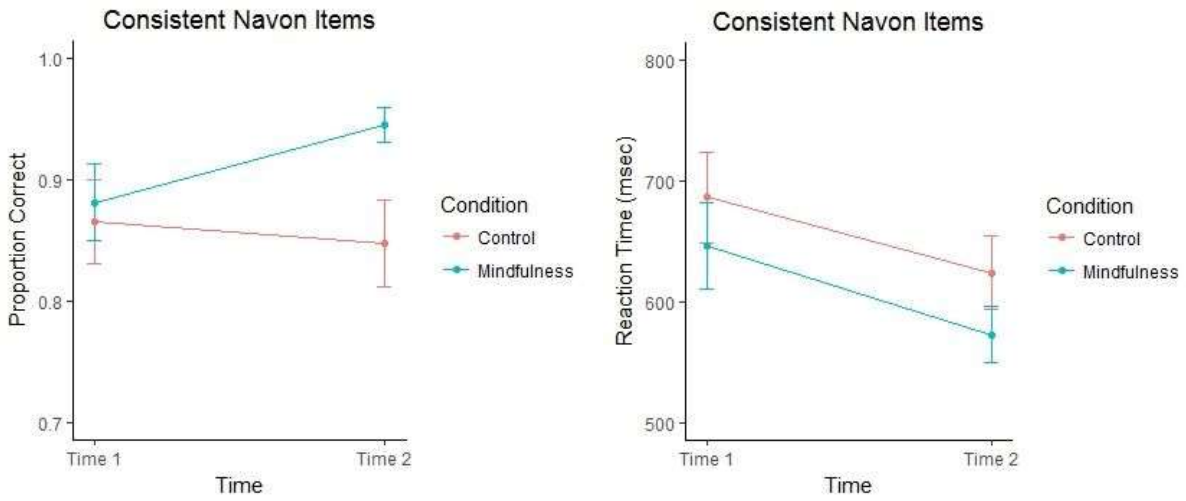

Figure 3.1. A: Proportion of correct responding on consistent items in the Navon task. B: Reaction time on correct responding on consistent items in the Navon task. Items are additionally broken down into Time 1 and Time 2. Error bars are Standard Error of the Mean (SEM).

3.2.1.2 Inconsistent Items

A repeated measures ANOVA was conducted for accuracy on inconsistent items with time as a within-groups factor and condition as a between-group factor. A main effect of condition was not observed; F(1, 45) = 0.0685, p = 0.795. Although approaching significance, a main effect of time was not observed; F (1, 45) = 2.661, p = 0.110. Additionally, an interaction effect of condition and time was not seen; F(1, 45) = 0.559 p = 0.458. See figure 3.2,

A repeated measures ANOVA was conducted for reaction time on inconsistent items with time as a within-groups factor and condition as a between-group factor. A main effect of condition was not observed; F(1, 45) = 0.419, p = 0.521. Although close to significance, a main effect of

time was not observed; F (1, 45) = 3.416, $p = 0.071$, $\eta^2 = 0.07$. An interaction effect of condition and time was not seen; F(1, 45) = 0.310, $p = 0.580$. See figure 3.2,

A. B.

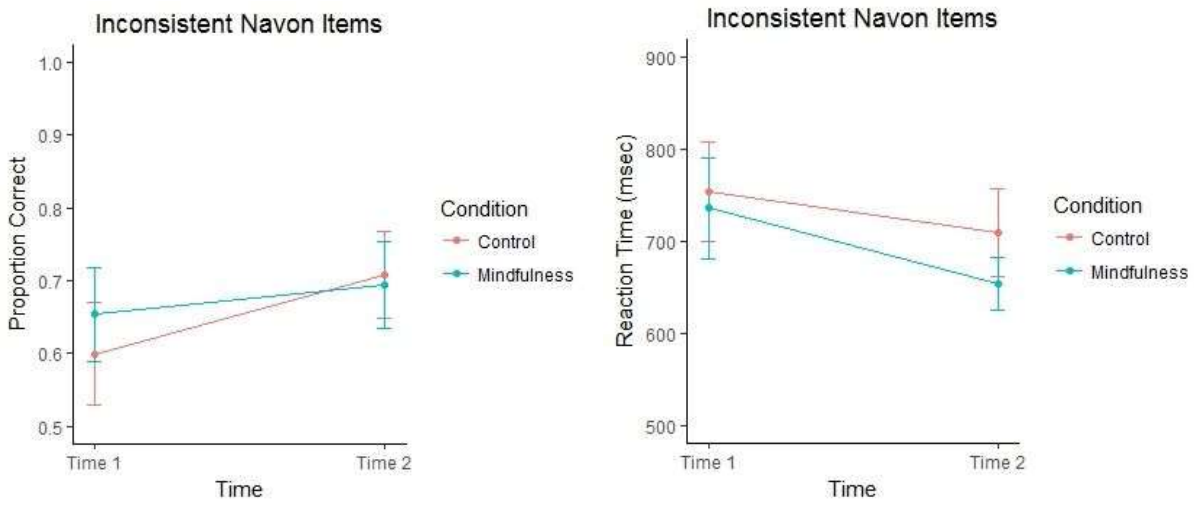

Figure 3.2. A: Proportion of correct responding on inconsistent items in the Navon task. B: Reaction time on correct responding on consistent items in the Navon task. Items are additionally broken down into Time 1 and Time 2. Error bars are Standard Error of the Mean (SEM).

3.2.2 Flanker Data

3.2.2.1 Consistent Items

A repeated measures ANOVA was conducted for accuracy on consistent items with time as a within-groups factor and condition as a between-group factor. A main effect of condition was not observed; F(1, 45) = 0.944, $p = 0.336$. A main effect of time was not observed; F(1, 45) = 2.3393, $p = 0.133$. Additionally, an interaction effect of condition and time was not seen; F(1, 45) = 0.0148, $p = 0.853$. See Figure 3.3.

A repeated measures ANOVA was conducted for reaction time on consistent items with time as a within-groups factor and condition as a between-group factor. A main effect of condition was observed; F(1, 45) = 4.34, $p = 0.043$, $\eta^2 = 0.088$. A post hoc Bonferroni adjustment indicated a

difference between conditions; t(45) = 2.08, p = 0.043. A main effect of time was not observed; F(1, 45) = 0.114, p = 0.737. Additionally, an interaction effect of condition and time was not seen; F(1, 45) = 0.191, p = 0.664. See figure 3.3,

A. B.

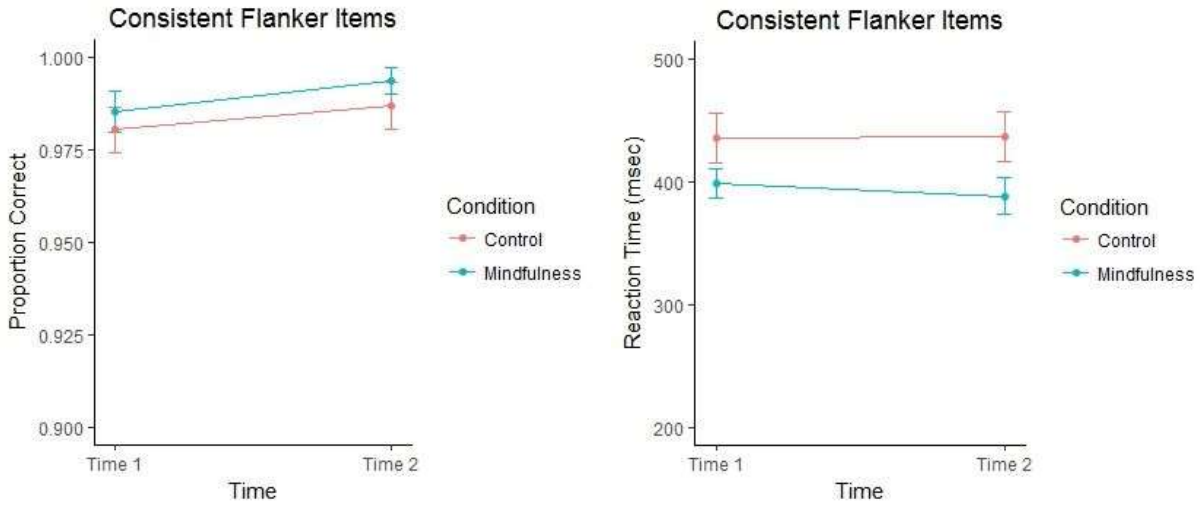

Figure 3.3. A: Proportion of correct responding on consistent items in the Flanker task. B: Reaction time on correct responding on consistent items in the Flanker task. Items are additionally broken down into Time 1 and Time 2. Error bars are Standard Error of the Mean (SEM).

3.2.2.2 Inconsistent Items

A repeated measures ANOVA was conducted for accuracy on inconsistent items with time as a within-groups factor and condition as a between-group factor. A main effect of condition was observed; F(1, 45) = 4.53, p = 0.039, η^2 = 0.091. A Bonferroni post hoc adjustment indicated a significant difference between the mindfulness and control conditions; t(45) = 2.13, p = 0.039. A main effect of time was not observed; F(1, 45) = 1.206, p = 0.278. Additionally, an interaction effect of condition and time was not seen; F(1, 45) = 0.793, p = 0.378. See Figure 3.4.

A repeated measures ANOVA was conducted for reaction time on inconsistent items with time as a within-groups factor and condition as a between-group factor. A main effect of condition was not observed; F(1, 45) = 2.28, p = 0.138. A main effect of time was observed; F(1, 45) =

7.7290, $p = 0.008$, $\eta^2 = 0.147$. A Bonferroni post hoc adjustment indicated a significant difference in both groups between Time 1 and Time 2; t(45) = 2.78, $p = 0.008$. An interaction effect of condition and time was not seen; F(1, 45) = 0.0874, $p = 0.869$. See figure 3.4.

A. B.

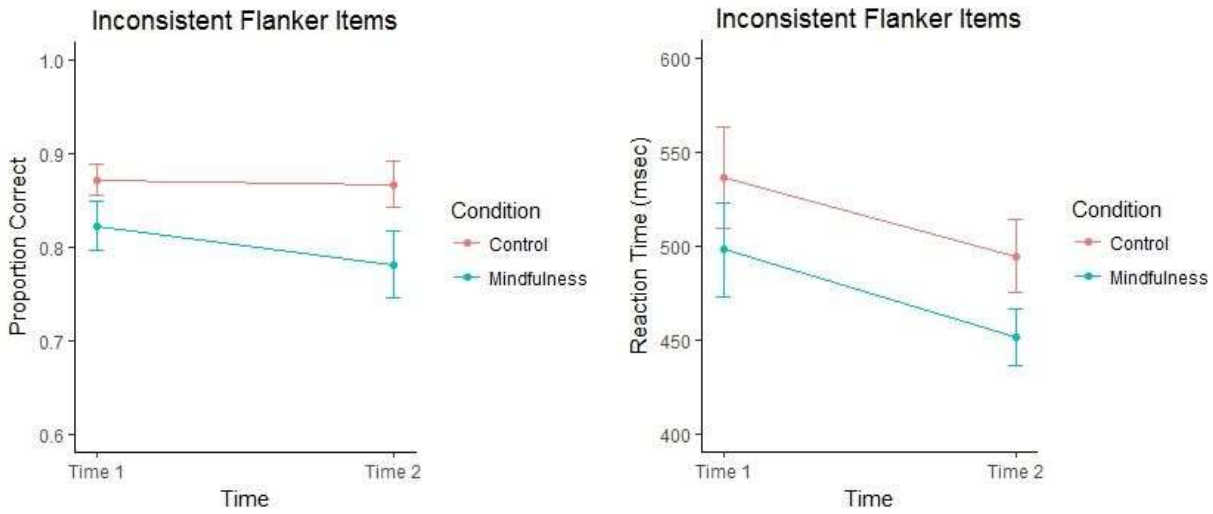

Figure 3.4. A: Proportion of correct responding on inconsistent items in the Flanker task. B: Reaction time on correct responding on inconsistent items in the Flanker task. Items are additionally broken down into Time 1 and Time 2. Error bars are Standard Error of the Mean (SEM).

3.2.2.3 Neutral Items

A repeated measures ANOVA was conducted for accuracy on neutral items with time as a and within-groups factor condition as a between-group factor. A main effect of condition was not observed; F(1, 45) = 0.0242, $p = 0.877$. A main effect of time was not observed; F(1, 45) = 0.0989, $p = 0.755$. However, an interaction effect of condition and time was seen; F(1, 45) = 5.6710, $p = 0.022$; $\eta^2 = 0.112$. A post hoc Bonferroni adjustment did not indicate any difference. A trend towards significant difference can be seen between the Control group at Time 1 and Time 2, t(45) = 1.886, $p = 0.394$. See Figure 3.9.

A repeated measures ANOVA was conducted for reaction time on neutral items with time as a within-groups factor and condition as a between-group factor. A main effect of condition was not observed; F(1, 45) = 3.65, $p = 0.063$. A main effect of time was observed; F(1, 45) = 6.38, $p =$

0.015, $\eta^2 = 0.121$. A Bonferroni post hoc adjustment indicated a significant difference in both groups between Time 1 and Time 2; t(45) = 2.53, $p = 0.015$. An interaction effect of condition and time was not seen; F(1, 45) = 1.44, $p = 0.237$. See figure 3.5.

A. B.

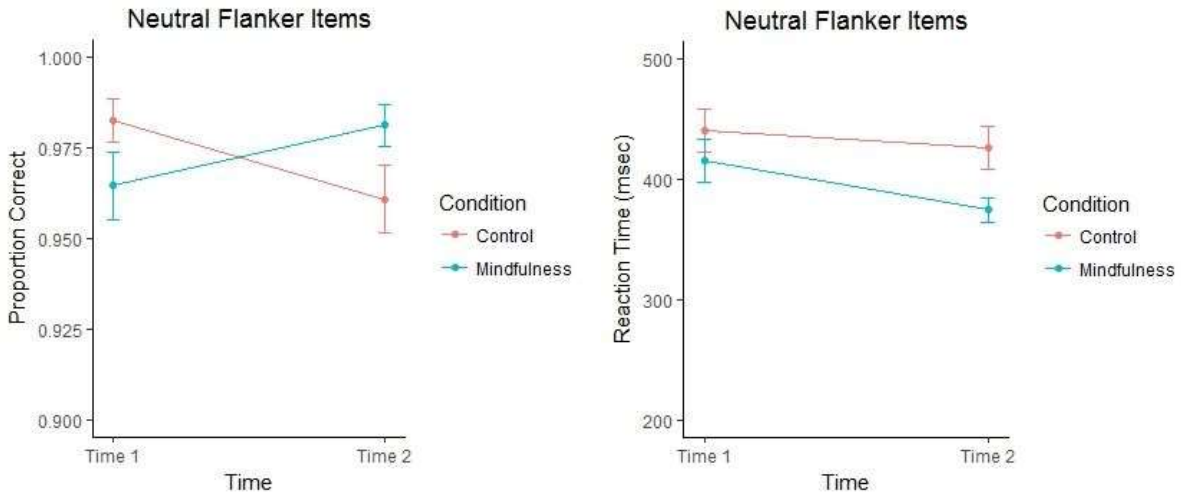

Figure 3.5. A: Proportion of correct responding on neutral items in the Flanker task. B: Reaction time on correct responding on neutral items in the Flanker task. Items are additionally broken down into Time 1 and Time 2. Error bars are Standard Error of the Mean (SEM).

3.2.3 Positive and Negative Affect Schedule

A repeated measures ANOVA was conducted for Time 1 and Time 2 positive affect scores on the PANAS questionnaire, with condition type as a between groups factor and time as a within-groups factor. A main effect of condition was not observed; F(1,45) = 0.386, $p = 0.537$. Additionally, a main effect of time was not observed; F (1,45) = 1.666, $p = 0.203$. An interaction effect of condition and time was not seen; F(1, 45) = 0.345, $p = 0.560$. See table 3.2,

A repeated measures ANOVA was conducted for Time 1 and Time 2 negative affect scores on the PANAS questionnaire, with condition type as a between groups factor and time as a within-groups factor. A main effect of condition was not observed; $F(1,45) = 0.3.15^{-4}$, $p = 0.986$. Also, a main effect of time was not observed; F (1,45) = 0.1, $p = 0.753$. An interaction effect of condition and time was not seen; F(1, 45) = 1.176, $p = 0.284$. See table 3.2,

Positive And Negative Affect Schedule

Positive Affect	Time One	Time Two
Control	M = 23.8, SD = 6.98	M = 24.4, SD = 9.00
Treatment	M = 24.8, SD = 8.61	M = 26.4, SD = 8.69
Negative Affect		
Control	M = 12.1, SD = 3.85	M = 13.7, SD = 3.77
Treatment	M = 13.5, SD = 3.18	M = 13.2, SD = 3.09

Table 3.2. Scores are broken down into Control and Treatment groups at Time 1 and Time 2 (M = Mean, SD = Standard Deviation).

3.2.4 Kentucky Inventory of Mindfulness Skills

A repeated measures ANOVA was conducted for time 1 and time 2 on KIMS *observation* scores with condition type as a between groups factor and time as a within-groups factor. A main effect of condition was not observed; $F(1,45) = 0.00149$, $p = 0.969$. A main effect of time was observed; $F(1,45) = 4.4606$, $p = 0.040$, $\eta^2 = 0.9$. A Bonferroni post-hoc adjustment indicated a significant difference between groups on Time 1 and Time 2; $t(45) = 2.11$, $p = 0.040$. Additionally, an interaction effect of condition and time was not seen; $F(1, 45) = 0.0172$, $p = 0.896$. See table 3.3,

A repeated measures ANOVA was conducted for Time 1 and Time 2 on KIMS *describing* scores with condition type as a between groups factor and time as a within-groups factor. A main effect of condition was not observed; $F(1, 45) = 0.264$, $p = 0.610$. A main effect of time was not observed; $F(1, 45) = 1.21$, $p = 0.277$. Additionally, an interaction effect of condition and time was not seen; $F(1, 45) = 1.39$, $p = 0.245$. See table 3.3,

A repeated measures ANOVA was conducted for Time 1 and Time 2 on KIMS *awareness* scores with condition type as a between groups factor and time as a within-groups factor. A main effect of condition was not observed; $F(1, 45) = 0.288$, $p = 0.594$. Additionally, a main effect of time was not observed; $F(1, 45) = 3.27$, $p = 0.077$. However, an interaction effect of condition and

time was seen; F(1, 45) = 5.54, p = 0.023, η^2 = 0.103. A post-hoc Bonferroni adjustment revealed a significant difference between Time 1 and Time 2 in the control group; t(45) = 2.9132, p = 0.033. This indicates that the control group experienced a significant decrease in their *awareness* scores while the mindfulness group was relatively unaffected. See table 3.3,

A repeated measures ANOVA was conducted for Time 1 and Time 2 on KIMS *acceptance* scores with condition type as a between groups factor and time as a within-groups factor. A main effect of condition was not observed; F(1, 45) = 0.258, p = 0.614. A main effect of time was observed; F (1, 45) = 5.75, p = 0.02, η^2 = 0.106. A post-hoc bonferroni adjustment revealed a significant difference in *acceptance* scores between time 1 and time 2 in both groups; t(45) = -2.40, p = 0.02. An interaction effect of condition and time was not seen; F(1, 46) = 3.67, p = 0.062, η^2 = 0.67. However, a post-hoc Bonferroni adjustment revealed a significant difference between time 1 and time 2 in the mindfulness group [t(45) = -3.008, p = 0.021], indicating that the mindfulness group saw a significant increase in their *acceptance* scores while the control group scores were relatively unaffected. See table 3.3,

Kentucky Inventory of Mindfulness Skills

Observe	Time One	Time Two
Control	M = 40.0, SD = 5.60	M = 38.5, SD = 6.78
Treatment	M = 40.1, SD = 7.25	M = 38.5, SD = 7.99
Describe		
Control	M = 29.4, SD = 5.63	M = 28.2, SD = 5.68
Treatment	M = 28.0, SD = 4.21	M = 28.1, SD = 5.96
Awareness	Time One	Time Two
Control	M = 29.7, SD = 4.81	M = 27.8, SD = 4.37
Treatment	M = 27.8, SD = 6.57	M = 28.0, SD = 6.77
Acceptance	Time One	Time Two
Control	M = 29.6, SD = 6.64	M = 29.9, SD = 8.32
Treatment	M = 27.2, SD = 6.79	M = 30.3, SD = 6.57

Table 3.3. Scores are broken down into Control and Treatment groups at Time 1 and Time 2 (M = Mean, SD = Standard Deviation).

3.3 Discussion

The second study sought to determine whether there was a difference in local attention between two groups of participants, where one group had been trained in a week-long guided meditation, and one group received no treatment. There is some reason to suggest that participants trained in mindfulness meditation practices have attention abilities that differ from the typical population (Chiesa et al., 2011). In particular, mindfulness meditation trains its practitioners to broaden their perceptional awareness without reacting to stimuli. In the context of this study, it was expected that participants who had trained in mindfulness would show more distraction from global, peripheral, or distracting images. However, the results of the current study provide mixed support for these claims.

3.3.1 Significant Results

It is important to note that we were primarily interested in an interaction effect taking place in the repeated-measures ANOVA of the results (3.2). While a main effect of time was often found in our data, it was not necessarily interesting if the scores both groups had changed in the same direction. Additionally, a main effect of condition showed little interest for the same reason. An interaction effect where one group stayed the same while the other significantly differed from Time 1 to Time 2 was of the greatest importance. This would demonstrate that that the treatment condition was experiencing a change in attention or personality measures, based on their mindfulness experience.

3.3.1.1 A Mindfulness Effect

A fundamental flaw of study one, was that there was no significant difference in the scores of participants on the personalities measures that were targeted towards determining level of mindfulness. In particular, there was no difference between the group scores on both the PANAS and KIMS questionnaires (see 2.2.4 and 2.2.5). As such, there was reason to suspect that one of two issues may have occurred. The first, is that our treatment effect was simply not strong

enough to impart an effect on Mindfulness on the experimental group. This is a concern because the central theme of both studies was determining how mindfulness groups differed from non-mindful groups on attentional tasks. If there was no effect of mindfulness in our treatment condition, then any differences in attentional preference would be moot. The second issue that could have occurred is that there simply was no difference in mindfulness characteristics between the two groups, not because there wasn't an effect of mindfulness from our treatment, but because the treatment that the control group received had qualities that may have been similar what the mindfulness condition experienced. The control group from study one listened to an audiobook. It could be that listening to an audiobook may share similar characteristics to that of a guided mindfulness practice, and as such put participants in a state of relaxation or reflection. During the second study, the control group was replaced with a no treatment condition, where participants were only asked to complete the attentional tasks (see 3.1.3). Additionally, in an attempt to increase the salience of the mindfulness treatment, the experimental condition was asked to engage in a guided meditation once per day, for seven days. The results indicated that there was significant differences on a few of the personality subscales that participants completed, as well as a general trend towards difference on those subscales that fell short of significance.

3.2.1.2.1 Positive and Negative Affect Scale

No significance differences were found between the treatment and control groups on the PANAS subscales. However, there was a noticeable trend for the mindfulness condition increasing its level of positive affect and decreasing its level of negative affect between the beginning and end of the study, while the control group either maintained its initial positive affect or increased its negative affect. Although not significant, it could indicate that participants in the mindful condition may have seen improvements that correlate with a mindfulness treatment.

3.2.1.2.2 Kentucky Inventory of Mindfulness Skills

In addition to a general trend towards better scores in the meditation group, a significant

difference between groups was found on a number of subscales of the KIMS questionnaire. Of particular interest was the interaction effect of condition and time in both of these subscales. The meditation group saw a significant increase in their acceptance scores, while the control was relatively unaffected. Additionally, the control group saw a decrease in their scores, while the meditation group maintained their level after the weeklong meditation practice. This seems to indicate that participants in the mindfulness condition were better at maintaining or increasing their scores in the KIMS questionnaire, while the control condition saw either a maintenance or decrease in score on the same subscales. This seems to signal that participants in the experimental group did undergo an effect of mindfulness after the weeklong guided-meditation treatment. However, there was little to no difference in the scores of participants on Observe and Describe subscales. Additionally, several limitations may contribute to interpreting these results with caution (see 3.3.2).

3.3.1.2 Attentional Preference

The current paper sought to determine if there was a difference in attentional preference on global/local tasks between a group trained in a weeklong guided mindfulness meditation, and a control group. Results indicated that participants in the mindfulness condition did not show any significant difference in accuracy or response time on the Navon task (see 3.2.1). There did seem to be a general trend towards better accuracy in the mindfulness condition on consistent items after the weeklong treatment, despite a post hoc test not confirming this. No other predicted interaction effects were seen in the attentional tests. Main effects of time and condition were seen sporadically, but they were were not necessarily interesting. For instance, the mindfulness condition scored significantly worse than the control condition on inconsistent items in the Flanker (3.2.2.2). However, because there was no interaction effect across the two sessions, it indicates that the treatment didn't seem to affect their score. Rather, that the participants in the treatment condition were simply worse, outside of any treatment effect. Additionally, there is some confusion over the interaction effect found on the neutral-oriented images on the Flanker task. No specific prediction was made about these trials, because there was no peripheral images to distract from (inconsistent), or confirm (consistent), the target image. As such, I am unsure as

to why an interaction effect occurred. Any biased or incomplete data was removed from the study, so as to not give confounding results. It may be, that in the absence of peripheral stimuli, that those trained in mindfulness meditation are better able to accurately identify the local target. However, the decrease in performance found in the control group, also indicates that this effect may be randomly generated due to low power.

What we had been hoping to find was that participants trained in mindfulness meditation would perform better on consistent items and worse on inconsistent items. In regards to the current hypothesis, we expected participants in the mindfulness condition to be more distracted by the global image, and perform worse on any items where the peripheral image conflicted with the target image. In other words, we expected participants in the mindfulness condition to have trouble identifying the local image in the Navon task, when the global image was not the same as the local image. However, because no significant interaction was found on inconsistent items, we can't conclude that any of the results support this hypothesis. Rather, we can only conclude that when the target image matches the peripheral images, participants trained in mindfulness are more accurate at identifying what the target image is, based on the significant results we had in the Navon test. Despite the lack of significance, there does seem to be a general trend in the data to suggest that participants in the mindfulness condition performed better on consistent items (3.2.1.1) and worse on inconsistent items (3.2.2.2). This supports the idea that the focus on broadening perceptual awareness in mindfulness training may contribute to tasks that make use of global/local processing being more impacted by peripheral features of an image. Specifically, mindfulness training may cause its practitioners to be more impacted by global features.

However, the conclusions of this study should be tempered with its limitations. First, we did not observe many significant differences between the two groups. As such, any conclusions about trends in the data needs to be interpreted with caution. As no statistically reliable difference was found between the groups, any trends seen could be explained by error in the data. Additionally, a fundamental issue was that of a small sample size. Both study one and study two had small samples sizes, which became a vital issue in study two when the the method was adapted to include repeated measures. This may have contributed to diminished power in the study, making

the significant results of the study less reliable. A G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) analysis (Power = 0.95, $\eta^2 = 0.25$) indicated that a sample size of 54 is adequate for within-between results, a sample size of 36 is adequate for within results, and a sample size of 158 is adequate for between groups results. While we have a decent sample size for within group differences (n = 47) and nearly enough participants for within-between differences, we severely lacked a sample size that could detect between group effects. Unfortunately, during data collection we ran out of time to collect participants, and those participants that we had collected were becoming less reliable as our testing period drew closer to our undergraduate participant's exam and final project due dates. As such, our ability to collect quality data was diminished.

What's more, because power was low, it is possible that the significant results found in our mindfulness measures (3.2.3 and 3.2.4) may not be adequate at indicating an effect of mindfulness. It is possible that despite the increase in treatment time in study two, our treatment of mindfulness was still not salient enough to have a measureable effect in our treatment condition. This could have occurred for a number of reasons. It's possible that the script we used (Appendix E) was simply not good at instilling a state of mindfulness. While the script makes mention to not reacting to thoughts, it primarily focuses on having the participant focus their attention on their breathing. This is not a characteristic that is unique to mindfulness meditation, and can be found in a number of other relaxation-based meditations. It is possible that this emphasis on breathing may have instilled a state of relaxation, but not mindfulness. However, an alternative explanation could be that our participants did not complete the treatment to satisfaction. While participants were asked to indicate whether they were able to complete the treatment, and how many times they listened to the guided-mindfulness exercise at home, there was no way to actually observe whether they had completed it on their own time. What's more, it is possible that while participants may have been listening to the audioclip, they were not paying attention to engaging in the exercise. Undergraduate participants have proven to be a somewhat unreliable sample in the past, and it is possible that they were not necessarily honest in their commitment to the study. This can be demonstrated by the eleven participants that had to be removed from study two. While a few were removed because of computer errors in their data collection, most of these participants were removed because they failed to appropriately

complete their personality measures, demographic questionnaires, attentional tasks, or because they admitted to not completing the treatment. What's more, because these participants were completing this study for course credit during the last few weeks of the semester, it may be that their motivation to complete this study to the best of their ability was somewhat diminished by their focus on things outside the realm of this experiment. These things include preparing for final exams, working on final projects, completing thesis or planning summer events.

3.3.2 Future Research

Future research should attempt to reconcile some of the issues that may have lead to the meditation treatment not having as great an effect on the treatment condition. The breathing-oriented script used should be compared with a mind-wandering treatment and determine if one treatment is superior to the other in terms of instilling a state of mindfulness. What's more, if the sample subjects used were unreliable, perhaps it would be reasonable to find a dedicated sample of subjects outside of a university environment. If a larger and more reliable sample can be found, then perhaps more participants will be likely to appropriately follow through with the treatment. Additionally, it could be argued that the Navon and Flanker tasks are only two tests in a large body of research that measures global/local performance. Future research may seek to investigate how other such tests (such as a Stroop interference task) are more successful at measuring attentional preference. In this case, perhaps improved tests may be better able to detect differences between groups trained in mindfulness meditation and the general public.

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Appendix A

Project Title: Emotion, Mood, and Thinking
Principal Investigator: *John Paul Minda, Ph.D., Dept. of Psychology, The University of Western Ontario*

Letter of Information

1. Invitation to Participate

You are being invited to participate in this research study about emotion, mood, and thinking because you have expressed interest in participating in this study and have signed up for this study on the Psychology Research Pool site.

2. Purpose of the Letter

The purpose of this letter is to provide you with information required for you to make an informed decision regarding participation in this research.

3. Purpose of this Study

This study is being conducted to understand how short sessions (approx. 15 min) of relaxation can affect subsequent cognitive processing.

4. Inclusion Criteria

Individuals are eligible to participate in this study if they are fluent in English (can read, write, and comprehend English with little difficulty) and have normal or corrected vision. Contacts or glasses are considered "corrected" and are acceptable.

5. Exclusion Criteria

Individuals who are not fluent in English and/or do not have normal or corrected vision are not eligible to participate in this study.

6. Study Procedures

If you agree to participate, you will be asked to engage in 15-minute relaxation session during which you may be asked to focus your attention, let your mind wander, or listen to relaxing music. After you have finished the relaxation session you will be asked to complete a series of cognitive tasks (problem-solving tasks, memory tasks, reasoning tasks, or categorization tasks). It is anticipated that the entire task will take one hour to complete, over one testing session. The task will be conducted in the Social Science Centre ([redacted]).

7. Possible Risks and Harms

There are no known or anticipated risks or discomforts associated with participating in this study.

8. Possible Benefits

You may not directly benefit from participating in this study but information gathered may provide benefits to society as a whole which include a better understanding of how certain types of relaxation techniques influence overall cognitive functioning

9. Compensation

If you are a **Psychology undergraduate student** who has registered for this study on the Psychology Research Pool site, you will receive **1 Research Participant Pool credit** for your participation in this study. If you withdraw from this study early (i.e., within the first half hour) you will still receive 1 research credit. Summer participants will receive 10$.

10. Voluntary Participation

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time with no effect on your academic standing and with no loss of your 1 research credit. You do not waive any legal rights by participating in this study.

11. Confidentiality

All data collected will remain confidential and accessible only to the investigators of this study. If the results are published, your name will not be used. If you choose to withdraw from this study, your data will be removed and destroyed from our database.

12. Contacts for Further Information

If you require any further information regarding this research project or your participation in the study you may contact Dr. Minda (Principle Investigator) at [redacted] or send an email to the general lab email address at [redacted]).

If you have any questions about your rights as a research participant or the conduct of this study, you may contact The Office of Research Ethics [redacted].

13. Publication

If the results of the study are published, your name will not be used. If you would like to receive a copy of any potential study results, please contact us at [redacted].

This letter is yours to keep for future reference.

Appendix B

Consent Form

Project Title: Emotion, Mood, and Thinking
Principal Investigator: *John Paul Minda, Ph.D., Dept. of Psychology, The University of Western Ontario*

I have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

Participant's Name (print): _____

Participant's Signature: _____

Date: _____

Person Obtaining Informed Consent (print): _____

Signature: _____

Date: _____

Appendix C

Demographic Survey

Gender: Male [ ] Female [ ] Unspecified [ ]

Age: _____

Year of study (if a student): 1 [ ] 2 [ ] 3 [ ] 4 [ ] >4 [ ]

Which of the following best describes your ethnicity? Select all that apply. If you feel none of these categories accurately reflects your ethnicity please specify your perceived ethnicity in the "Other" category:

- White
- Chinese
- South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
- Black
- Filipino
- Latin American
- Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, etc.)
- Arab
- West Asian (e.g., Iranian, Armenian, Afghani, etc.)
- Korean
- Japanese
- Other, Please Specify _____

Which of the following best describes your religious affiliation? If you feel none of these categories accurately reflects your religious affiliation please specify your perceived religious affiliation in the "Other" category:

- Catholic
- Protestant
- Christian Orthodox
- Christian not otherwise stated
- Muslim
- Jewish
- Buddhist
- Hindu
- Sikh
- Eastern religions (e.g., Baha'i, Eckankar, Jains, Shinto, Taoist, etc.)
- No religious affiliation (e.g. Agnostic, Atheist, Humanist, etc.)

o Other, Please Specify _____

Prior Experience with Meditation, Yoga, and Other Practices:

Do you have prior meditation or contemplative experience?

Yes [ ] No [ ]

If yes, what kind of meditation do you/have you practiced?

a) Mindfulness (e.g. MBSR, MBCT, other mindfulness programs)
b) Zen
c) Loving-kindness
d) Transcendental
e) Other _____

If yes, how long have you practiced?

a) 1-3 months
b) 3-6 months
c) 6-12 months
d) 1-3 years
e) 3+ years: number of years _____

If you practice currently, how frequently on average do you practice?

a) 1-2x/day
b) 3 or more x/week
c) 1 or 2x/week
d) Weekly or biweekly
e) Other_____

Do you practice yoga regularly (e.g. one or more times/week)?

Yes [ ] No [ ]

If yes, how long have you practiced?

a) 1-3 months
b) 3-6 months
c) 6-12 months
d) 1-3 years
e) 3+ years : number of years _____

Do you practice tai chi or any other mind-body practice (Qigong, Aikido, etc.)?

Yes [ ] No [ ]

If yes, how long have you practiced?

a) 1-3 months
b) 3-6 months
c) 6-12 months
d) 1-3 years
e) 3+ years : number of years _____

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item, and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way ***right now, that is at the present moment***. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

_____interested	_____irritable
_____distressed	_____alert
_____excited	_____ashamed
_____upset	_____inspired
_____strong	_____nervous
_____guilty	_____determined
_____scared	_____attentive
_____hostile	_____jittery
_____enthusiastic	_____active
_____proud	_____afraid

Kentucky Inventory of Mindfulness Skills

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

Never or Very Rarely True	Rarely True	Sometimes True	Often True	Very Often or Always True
1	2	3	4	5

_____1. I notice changes in my body, such as whether my breathing slows down or speeds up.

_____2. I'm good at finding the words to describe my feelings.

_____3. When I do things, my mind wanders off and I'm easily distracted.

_____4. I criticize myself for having irrational or inappropriate emotions.

_____5. I pay attention to whether my muscles are tense or relaxed.

_____6. I can easily put my beliefs, opinions, and expectations into words.

_____7. When I'm doing something, I'm only focused on what I'm doing, nothing else.

_____8. I tend to evaluate whether my perceptions are right or wrong.

_____9. When I'm walking, I deliberately notice the sensations of my body moving.

_____10. I'm good at thinking of words to express my perceptions, such as how things taste, smell, or sound.

_____11. I drive on "automatic pilot" without paying attention to what I'm doing.

_____12. I tell myself that I shouldn't be feeling the way I'm feeling.

_____13. When I take a shower or bath, I stay alert to the sensations of water on my body.

_____14. It's hard for me to find the words to describe what I'm thinking.

_____15. When I'm reading, I focus all my attention on what I'm reading.

_____16. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.

_____17. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.

_____18. I have trouble thinking of the right words to express how I feel about things.

_____19. When I do things, I get totally wrapped up in them and don't think about anything else.

_____20. I make judgments about whether my thoughts are good or bad.

_____21. I pay attention to sensations, such as the wind in my hair or sun on my face.

_____22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.

_____23. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.

_____24. I tend to make judgments about how worthwhile or worthless my experiences are.

_____25. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.

_____26. Even when I'm feeling terribly upset, I can find a way to put it into words.

_____27. When I'm doing chores, such as cleaning or laundry, I tend to daydream or think of other things.

_____28. I tell myself that I shouldn't be thinking the way I'm thinking.

_____29. I notice the smells and aromas of things.

_____30. I intentionally stay aware of my feelings.

_____31. I tend to do several things at once rather than focusing on one thing at a time.

_____32. I think some of my emotions are bad or inappropriate and I shouldn't feel them.

_____33. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.

_____34. My natural tendency is to put my experiences into words.

_____35. When I'm working on something, part of my mind is occupied with other topics, such as what I'll be doing later, or things I'd rather be doing.

_____36. I disapprove of myself when I have irrational ideas.

_____37. I pay attention to how my emotions affect my thoughts and behavior.

_____38. I get completely absorbed in what I'm doing, so that all my attention is focused on it.

_____39. I notice when my moods begin to change.

Additional Follow-Up Questions

1) Did you pay attention to the audio played over the headphones?

Yes [ ] No [ ]

2) Did you hear any instructions while listening to the audio?

Yes [ ] No [ ]

If yes:

a) Did you attempt to follow these instructions?

Yes [ ] No [ ]

b) How successful do you feel you were in following these instructions?

1	2	3	4	5	6	7
Not at all successful						Very successful

3) Did you find your mind wandering while listening to the audio?

Yes [ ] No [ ]

4) Did you find yourself falling asleep while listening to the audio?

Yes [ ] No [ ]

5) If you have any additional comments regarding the audio, please write them below:

Appendix D

Research Assistant Script

“The study you will be participating in today consists of three main parts. For the first part, you will listen to some audio through headphones. The volume should already be set to a comfortable level, but if you find that it is too loud or quiet you can adjust it using the volume keys on the keyboard. Once the audio has finished, the second part of the study will begin automatically.

For this portion of the study, you will be asked to complete three tasks. Each of these tasks will be done on the computer. Instructions for each task will be provided on the computer screen and you will type all of your responses on the keyboard. Once you have completed all three of the computer's tasks, you will see a message on the screen saying that the study has concluded. At that point you may leave the computer and come back into the room where you will be given a questionnaire to complete.

Don’t be concerned if the other participant completes the study before you. No two tasks are the same. Work at your own pace and try your best.

Do you have any questions before we get started?”

Appendix E

Breathing meditation script

Today we are going to practice focusing our attention on the sensation of the breath, paying as much attention as we can to any sensations of the breath in a specific area of the body, and when we notice that our mind has wandered into thoughts or feelings, we gently bring our awareness back to the breath, and begin again.

Today's practice will last for about 10 minutes.

For this practice sit in a comfortable but alert posture in your chair. Your feet should be flat on the floor, your back should be upright but not uncomfortably or unnaturally so. Your arms can rest on the chair's armrests, or you can rest your arms in your lap.

It is important to note that we are not trying to change how we are breathing, or trying to make anything happen, we are simply noticing where we feel the breath most clearly in our body, and trying to remain focused on the breath from that anchor point, one breath at a time.

Once you are seated comfortably, close your eyes, or look down in front of you with a soft gaze so you can better focus on the breath.

Begin by tuning into the feeling of your feet against the floor, to your hands in our laps or on the armrests of the chair you're sitting in, just tuning into the felt sense of the body at this moment.

Letting the breath happen very naturally without forcing anything, notice where you feel the breath most clearly in your body. It may be at the entrance to the nostrils, the neck, the chest, the belly, or somewhere else.

Wherever you notice the sense of the breath most strongly, anchor your awareness here. There is no best place to be feeling the breath in the body, simply tune in to where you can sense it

most clearly.

The place you feel the breath most clearly or vividly in your body is your anchor, where you will be returning your attention to again and again, every time that you notice that your mind has wandered off somewhere else.

From your anchor point in the body, where you feel the breath most vividly, see if you can notice the beginning of the next in breath, and try to follow it through to the out breath. Simply be aware of breathing in, and breathing out.

(pause)

As you pay attention to the breath, you might notice that there is a moment between the in breath and the outbreath, where the in breath is transformed into the out breath.

See if you can be present from the very beginning of the next in breath, through to the end of the outbreath.

(pause)

When you notice that your mind has wandered away into thoughts, or feelings, simply note that your mind has wandered, and return gently to the breath, without judging or criticizing yourself.

(pause)

Breathing in, breathing out, not trying to change anything, or make anything happen, just being with our breath in the present moment.

(pause)

For the next few moments, we're going to sit quietly, and, as best we can, one breath at a time, staying connected with, and curious about the sensations of the breath at our home base of the breath in the body.

(pause for 45 seconds)

When you notice that your mind has wandered off, it's not a problem, just recognize that it wandered away from the breath and simply return your awareness to the present moment, to the next in breath, and the next out breath.

(pause for 30 seconds)

Always coming back, to the in breath, to the out breath, this moment in the present, no need to change anything, or make anything happen, just being interested in the next in breath, the next out breath, beginning again when your mind wanders off, beginning as many times as you need to, without criticism or judgment.

(pause)

As you sit here, aware of your breathing, aware of your body, you may also notice that you can be aware of the breath, and the body, but also be aware of sounds in your environment. Staying present with the breath and the body, open your awareness up to the sounds you hear in the room, feeling the air around you, feeling again the soles of your feet against the floor, and your body in the chair.

Take a few nice, deep breaths, and when you're ready gently open your eyes if they were closed bringing your awareness back to the room, to where you are right now.

Appendix F

The Hobbit Script

In a hole in the ground there lived a hobbit. Not a nasty, dirty, wet hole, filled with the ends of worms and an oozy smell, nor yet a dry, bare, sandy hole with nothing in it to sit down on or to eat: it was a hobbit-hole, and that means comfort. It had a perfectly round door like a porthole, painted green, with a shiny yellow brass knob in the exact middle. The door opened on to a tube-shaped hall like a tunnel: a very comfortable tunnel without smoke, with panelled walls, and floors tiled and carpeted, provided with polished chairs, and lots and lots of pegs for hats and coats—the hobbit was fond of visitors. The tunnel wound on and on, going fairly but not quite straight into the side of the hill —The Hill, as all the people for many miles round called it—and many little round doors opened out of it, first on one side and then on another. No going upstairs for the hobbit: bedrooms, bathrooms, cellars, pantries (lots of these), wardrobes (he had whole rooms devoted to clothes), kitchens, dining-rooms, all were on the same floor, and indeed on the same passage. The best rooms were all on the left-hand side (going in), for these were the only ones to have windows, deep-set round windows looking over his garden, and meadows beyond, sloping down to the river. This hobbit was a very well-to-do hobbit, and his name was Baggins. The Bagginses had lived in the neighbourhood of The Hill for time out of mind, and people considered them very respectable, not only because most of them were rich, but also because they never had any adventures or did anything unexpected: you could tell what a Baggins would say on any question without the bother of asking him. This is a story of how a Baggins had an adventure, and found himself doing and saying things altogether unexpected. He may have lost the neighbours' respect, but he gained—well, you will see whether he gained anything in the end. The mother of our particular hobbit—what is a hobbit? I suppose hobbits need some description nowadays, since they have become rare and shy of the Big People, as they call us. They are (or were) a little people, about half our height, and smaller than the bearded Dwarves. Hobbits have no beards. There is little or no magic about them, except the ordinary everyday sort which helps them to disappear quietly and quickly when large stupid folk like you and me come blundering along, making a noise like elephants which they can hear a mile off. They are

inclined to be fat in the stomach; they dress in bright colours (chiefly green and yellow); wear no shoes, because their feet grow natural leathery soles and thick warm brown hair like the stuff on their heads (which is curly); have long clever brown fingers, good-natured faces, and laugh deep fruity laughs (especially after dinner, which they have twice a day when they can get it). Now you know enough to go on with. As I was saying, the mother of this hobbit —of Bilbo Baggins, that is—was the famous Belladonna Took, one of the three remarkable daughters of the Old Took, head of the hobbits who lived across The Water, the small river that ran at the foot of The Hill. It was often said (in other families) that long ago one of the Took ancestors must have taken a fairy wife. That was, of course, absurd, but certainly there was still something not entirely hobbitlike about them, and once in a while members of the Took-clan would go and have adventures. They discreetly disappeared, and the family hushed it up; but the fact remained that the Tooks were not as respectable as the Bagginses, though they were undoubtedly richer. Not that Belladonna Took ever had any adventures after she became Mrs. Bungo Baggins. Bungo, that was Bilbo's father, built the most luxurious hobbit-hole for her (and partly with her money) that was to be found either under The Hill or over The Hill or across The Water, and there they remained to the end of their days. Still it is probable that Bilbo, her only son, although he looked and behaved exactly like a second edition of his solid and comfortable father, got something a bit queer in his make-up from the Took side, something that only waited for a chance to come out. The chance never arrived, until Bilbo Baggins was grown up, being about fifty years old or so, and living in the beautiful hobbit-hole built by his father, which I have just described for you, until he had in fact apparently settled down immovably. By some curious chance one morning long ago in the quiet of the world, when there was less noise and more green, and the hobbits were still numerous and prosperous, and Bilbo Baggins was standing at his door after breakfast smoking an enormous long wooden pipe that reached nearly down to his woolly toes (neatly brushed)—Gandalf came by. Gandalf! If you had heard only a quarter of what I have heard about him, and I have only heard very little of all there is to hear, you would be prepared for any sort of remarkable tale. Tales and adventures sprouted up all over the place wherever he went, in the most extraordinary fashion. He had not been down that way under The Hill for ages and ages, not since his friend the Old Took died, in fact, and the hobbits had almost forgotten what he

looked like. He had been away over The Hill and across The Water on businesses of his own since they were all small hobbit-boys and hobbit-girls. All that the unsuspecting Bilbo saw that morning was an old man with a staff. He had a tall pointed blue hat, a long grey cloak, a silver scarf over which his long white beard hung down below his waist, and immense black boots. "Good Morning!" said Bilbo, and he meant it. The sun was shining, and the grass was very green. But Gandalf looked at him from under long bushy eyebrows that stuck out further than the brim of his shady hat. "What do you mean?" he said. "Do you wish me a good morning, or mean that it is a good morning whether I want it or not; or that you feel good this morning; or that it is a morning to be good on?" "All of them at once," said Bilbo. "And a very fine morning for a pipe of tobacco out of doors, into the bargain. If you have a pipe about you, sit down and have a fill of mine! There's no hurry, we have all the day before us!" Then Bilbo sat down on a seat by his door, crossed his legs, and blew out a beautiful grey ring of smoke that sailed up into the air without breaking and floated away over The Hill. "Very pretty!" said Gandalf. "But I have no time to blow smoke-rings this morning. I am looking for someone to share in an adventure that I am arranging, and it's very difficult to find anyone." "I should think so—in these parts! We are plain quiet folk and have no use for adventures. Nasty disturbing uncomfortable things! Make you late for dinner! I can't think what anybody sees in them," said our Mr. Baggins, and stuck one thumb behind his braces, and blew out another even bigger smoke-ring. Then he took out his morning letters, and began to read, pretending to take no more notice of the old man. He had decided that he was not quite his sort, and wanted him to go away. But the old man did not move. He stood leaning on his stick and gazing at the hobbit without saying anything, till Bilbo got quite uncomfortable and even a little cross. "Good morning!" he said at last. "We don't want any adventures here, thank you! You might try over The Hill or across The Water." By this he meant that the conversation was at an end. "What a lot of things you do use Good morning for!" said Gandalf. "Now you mean that you want to get rid of me, and that it won't be good till I move off." "Not at all, not at all, my dear sir! Let me see, I don't think I know your name?" "Yes, yes, my dear sir—and I do know your name, Mr. Bilbo Baggins. And you do know my name, though you don't remember that I belong to it. I am Gandalf, and Gandalf means me! To think that I

should have lived to be goodmorninged by Belladonna Took's son, as if I was selling buttons at the door!"

Appendix G

Project Title: Emotion, Mood, and Thinking
Principal Investigator: *John Paul Minda, Ph.D., Dept. of Psychology, The University of Western Ontario*

Letter of Information

1. Invitation to Participate

You are being invited to participate in this research study about emotion, mood, and thinking because you have expressed interest in participating in this study and have signed up for this study on the Psychology Research Pool site.

2. Purpose of the Letter

The purpose of this letter is to provide you with information required for you to make an informed decision regarding participation in this research.

3. Purpose of this Study

This study is being conducted to understand how short sessions (approx. 15 min) of relaxation can affect subsequent cognitive processing.

4. Inclusion Criteria

Individuals are eligible to participate in this study if they are fluent in English (can read, write, and comprehend English with little difficulty) and have normal or corrected vision. Contacts or glasses are considered "corrected" and are acceptable.

5. Exclusion Criteria

Individuals who are not fluent in English and/or do not have normal or corrected vision are not eligible to participate in this study.

6. Study Procedures

The following study will take place over the course of seven days. For the first and last day of the study, you will meet in the Social Science Centre ([redacted]) and complete a series of cognitive tasks (problem-solving tasks, memory tasks, reasoning tasks, or categorization tasks). It is anticipated that the session may take one hour to complete. During the remainder of the week (between the first and last testing session) you are asked to do nothing (in regards to this study). On the seventh day, you will return to complete the final assessment.

7. Possible Risks and Harms

There are no known or anticipated risks or discomforts associated with participating in this study.

8. Possible Benefits

You may not directly benefit from participating in this study but information gathered may provide benefits to society as a whole which include a better understanding of how certain types of relaxation techniques influence overall cognitive functioning

9. Compensation

If you are a Psychology undergraduate student who has registered for this study on the Psychology Research Pool site, you will receive 3 Research Participant Pool credits at the end of the study for your participation. If you withdraw from this study early (i.e., within the first half hour) you will still receive 1 research credit.

10. Voluntary Participation

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time with no effect on your academic standing and with no loss of your 1 research credit. You do not waive any legal rights by participating in this study.

11. Confidentiality

All data collected will remain confidential and accessible only to the investigators of this study. If the results are published, your name will not be used. If you choose to withdraw from this study, your data will be removed and destroyed from our database.

12. Contacts for Further Information

If you require any further information regarding this research project or your participation in the study you may contact Dr. Minda (Principle Investigator) at [redacted].

If you have any questions about your rights as a research participant or the conduct of this study, you may contact The Office of Research Ethics [redacted]

13. Publication

If the results of the study are published, your name will not be used. If you would like to receive a copy of any potential study results, please contact us at [redacted]

This letter is yours to keep for future reference.

Appendix H

Project Title: Emotion, Mood, and Thinking
Principal Investigator: *John Paul Minda, Ph.D., Dept. of Psychology, The University of Western Ontario*

Letter of Information

1. Invitation to Participate

You are being invited to participate in this research study about emotion, mood, and thinking because you have expressed interest in participating in this study and have signed up for this study on the Psychology Research Pool site.

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Individuals are eligible to participate in this study if they are fluent in English (can read, write, and comprehend English with little difficulty) and have normal or corrected vision. Contacts or glasses are considered "corrected" and are acceptable.

5. Exclusion Criteria

Individuals who are not fluent in English and/or do not have normal or corrected vision are not eligible to participate in this study.

6. Study Procedures

The following study will take place over the course of seven days. For the first and last day of the study, you will meet in the Social Science Centre ([redacted]) and engage in a 15-minute relaxation session during which you may be asked to focus your attention, let your mind wander, or listen to relaxing music. After you have finished the relaxation session you will be asked to complete a series of cognitive tasks (problem-solving tasks, memory tasks, reasoning tasks, or categorization tasks). It is anticipated that the session may take one hour to complete. During the remainder of the week (between the first and last testing session) you will be asked to engage in a 15-minute relaxation session each day on your own time. On the seventh day, you will return to complete the final assessment.

7. Possible Risks and Harms

There are no known or anticipated risks or discomforts associated with participating in this study.

8. Possible Benefits

You may not directly benefit from participating in this study but information gathered may provide benefits to society as a whole which include a better understanding of how certain types of relaxation techniques influence overall cognitive functioning

9. Compensation

If you are a Psychology undergraduate student who has registered for this study on the Psychology Research Pool site, you will receive 3 Research Participant Pool credits at the end of the study for your participation. If you withdraw from this study early (i.e., within the first half hour) you will still receive 1 research credit.

10. Voluntary Participation

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time with no effect on your academic standing and with no loss of your 1 research credit. You do not waive any legal rights by participating in this study.

11. Confidentiality

All data collected will remain confidential and accessible only to the investigators of this study. If the results are published, your name will not be used. If you choose to withdraw from this study, your data will be removed and destroyed from our database.

12. Contacts for Further Information

If you require any further information regarding this research project or your participation in the study you may contact Dr. Minda (Principle Investigator) at [redacted].

If you have any questions about your rights as a research participant or the conduct of this study, you may contact The Office of Research Ethics [redacted]

13. Publication

If the results of the study are published, your name will not be used. If you would like to receive a copy of any potential study results, please contact us at[redacted]

This letter is yours to keep for future reference.

Appendix I

Research Assistant Script

For Control Group:

"The study you will be participating in is a longitudinal study taking place over seven days. You are only required to come to the lab on the first and seventh day of the study where we will take an initial and final reading. You will need to schedule a time, with myself (the research assistant), seven days from now that you can return to finish the study. It would be easiest for all of you to return at the same time that we've met today. At that point you will receive your three credits for the completion of the study."

"The study you will be participating in consists of two main parts. For the first part of the study, you will be asked to complete two tasks. Both of these tasks will be done on the computer. Instructions for each task will be provided on the computer screen and you will type all of your responses on the keyboard.

Once you have completed both of the computer's tasks, you will see a message on the screen saying that the study has concluded. At that point you may leave the computer and come back into the room where you will be given a questionnaire to complete.

Don't be concerned if other participants complete the study before you. No two tasks are the same. Work at your own pace and try your best.

Do you have any questions before we get started?"

For Treatment Group:

"The study you will be participating in is a longitudinal study taking place over seven days. You are only required to come to the lab on the first and seventh day of the study where we will take an initial and final reading. During the rest of the week you will be asked to listen to an audio clip for 10 minutes, once a day. We recommend that you listen to the audio clip at the same time

everyday – do not listen to the clip before bed. It is recommended that you listen to it around mid-day. Set a repeating alarm to remind yourself.

Additionally, you will need to schedule a time, with myself (the research assistant), seven days from now that you can return to finish the study. It would be easiest for all of you to return at the same time that we've met today. At that point you will receive your three credits for the completion of the study."

"The study you will be participating in consists of three main parts. For the first part, you will listen to some audio through headphones. The volume should already be set to a comfortable level, but if you find that it is too loud or quiet you can adjust it using the volume keys on the keyboard.

Once the audio has finished, the second part of the study will begin automatically. For this portion of the study, you will be asked to complete two tasks. Both of these tasks will be done on the computer. Instructions for each task will be provided on the computer screen and you will type all of your responses on the keyboard.

Once you have completed all three of the computer's tasks, you will see a message on the screen saying that the study has concluded. At that point you may leave the computer and come back into the room where you will be given a questionnaire to complete.

Don't be concerned if the other participant completes the study before you. No two tasks are the same. Work at your own pace and try your best.

Do you have any questions before we get started?"

Appendix J

Demographic Survey

Gender: Male [ ] Female [ ] Unspecified [ ]

Age: _____

Year of study (if a student): 1 [ ] 2 [ ] 3 [ ] 4 [ ] >4 [ ]

Which of the following best describes your ethnicity? Select all that apply. If you feel none of these categories accurately reflects your ethnicity please specify your perceived ethnicity in the "Other" category:

- White
- Chinese
- South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)
- Black
- Filipino
- Latin American
- Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, etc.)
- Arab
- West Asian (e.g., Iranian, Armenian, Afghani, etc.)
- Korean
- Japanese
- Other, Please Specify _____

Which of the following best describes your religious affiliation? If you feel none of these categories accurately reflects your religious affiliation please specify your perceived religious affiliation in the "Other" category:

- Catholic
- Protestant
- Christian Orthodox
- Christian not otherwise stated
- Muslim
- Jewish
- Buddhist
- Hindu
- Sikh
- Eastern religions (e.g., Baha'i, Eckankar, Jains, Shinto, Taoist, etc.)
- No religious affiliation (e.g. Agnostic, Atheist, Humanist, etc.)

o Other, Please Specify _____

Prior Experience with Meditation, Yoga, and Other Practices:

Do you have prior meditation or contemplative experience?

Yes [ ] No [ ]

If yes, what kind of meditation do you/have you practiced?

a) Mindfulness (e.g. MBSR, MBCT, other mindfulness programs)
b) Zen
c) Loving-kindness
d) Transcendental
e) Other _____

If yes, how long have you practiced?

a) 1-3 months
b) 3-6 months
c) 6-12 months
d) 1-3 years
e) 3+ years: number of years _____

If you practice currently, how frequently on average do you practice?

a) 1-2x/day
b) 3 or more x/week
c) 1 or 2x/week
d) Weekly or biweekly
e) Other_____

Do you practice yoga regularly (e.g. one or more times/week)?

Yes [ ] No [ ]

If yes, how long have you practiced?

a) 1-3 months
b) 3-6 months
c) 6-12 months
d) 1-3 years
e) 3+ years : number of years _____

Do you practice tai chi or any other mind-body practice (Qigong, Aikido, etc.)?

Yes [ ] No [ ]

If yes, how long have you practiced?

a) 1-3 months
b) 3-6 months
c) 6-12 months
d) 1-3 years
e) 3+ years : number of years _____

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item, and then mark the appropriate answer in the space next to that word. Indicate to what extent you have felt this way ***right now, that is at the present moment***. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

_____interested	_____irritable
_____distressed	_____alert
_____excited	_____ashamed
_____upset	_____inspired
_____strong	_____nervous
_____guilty	_____determined
_____scared	_____attentive
_____hostile	_____jittery
_____enthusiastic	_____active
_____proud	_____afraid

Kentucky Inventory of Mindfulness Skills

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

Never or Very Rarely True	Rarely True	Sometimes True	Often True	Very Often or Always True
1	2	3	4	5

_____1. I notice changes in my body, such as whether my breathing slows down or speeds up.

_____2. I'm good at finding the words to describe my feelings.

_____3. When I do things, my mind wanders off and I'm easily distracted.

_____4. I criticize myself for having irrational or inappropriate emotions.

_____5. I pay attention to whether my muscles are tense or relaxed.

_____6. I can easily put my beliefs, opinions, and expectations into words.

_____7. When I'm doing something, I'm only focused on what I'm doing, nothing else.

_____8. I tend to evaluate whether my perceptions are right or wrong.

_____9. When I'm walking, I deliberately notice the sensations of my body moving.

_____10. I'm good at thinking of words to express my perceptions, such as how things taste, smell, or sound.

_____11. I drive on "automatic pilot" without paying attention to what I'm doing.

_____12. I tell myself that I shouldn't be feeling the way I'm feeling.

_____13. When I take a shower or bath, I stay alert to the sensations of water on my body.

_____14. It's hard for me to find the words to describe what I'm thinking.

_____15. When I'm reading, I focus all my attention on what I'm reading.

_____16. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.

_____17. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.

_____18. I have trouble thinking of the right words to express how I feel about things.

_____19. When I do things, I get totally wrapped up in them and don't think about anything else.

_____20. I make judgments about whether my thoughts are good or bad.

_____21. I pay attention to sensations, such as the wind in my hair or sun on my face.

_____22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.

_____23. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.

_____24. I tend to make judgments about how worthwhile or worthless my experiences are.

_____25. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.

_____26. Even when I'm feeling terribly upset, I can find a way to put it into words.

_____27. When I'm doing chores, such as cleaning or laundry, I tend to daydream or think of other things.

_____28. I tell myself that I shouldn't be thinking the way I'm thinking.

_____29. I notice the smells and aromas of things.

_____30. I intentionally stay aware of my feelings.

_____31. I tend to do several things at once rather than focusing on one thing at a time.

_____32. I think some of my emotions are bad or inappropriate and I shouldn't feel them.

_____33. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.

_____34. My natural tendency is to put my experiences into words.

_____35. When I'm working on something, part of my mind is occupied with other topics, such as what I'll be doing later, or things I'd rather be doing.

_____36. I disapprove of myself when I have irrational ideas.

_____37. I pay attention to how my emotions affect my thoughts and behavior.

_____38. I get completely absorbed in what I'm doing, so that all my attention is focused on it.

_____39. I notice when my moods begin to change.

Additional Follow-Up Questions

1) Did you pay attention to the audio played over the headphones?

Yes [ ] No [ ]

2) Did you hear any instructions while listening to the audio?

Yes [ ] No [ ]

If yes:

a) Did you attempt to follow these instructions?

Yes [ ] No [ ]

b) How successful do you feel you were in following these instructions?

1	2	3	4	5	6	7
Not at all successful						Very successful

c) Did you find your mind wandering while listening to the audio?

Yes [ ] No [ ]

d) Did you find yourself falling asleep while listening to the audio?

Yes [ ] No [ ]

3) How many hours of sleep did you receive each night over the past week?

_____

4) If you have any additional comments regarding the audio, please write them below

Part 2 of Study ONLY:

1. **Did you manage to listen to the audio recordings each day?**
2. **How many times did you listen to the audio recordings on your own (1-5)?**

_____

Curriculum Vitae

Joshua Hatherley, B.A.

Department of Psychology &
Brain and Mind Institute
The University of Western Ontario,
London, Ontario,

Profile:

Research Disciplines: Psychology
Areas of Research: Categorization, Cognitive Flexibility, Ego Depletion, Mindfulness Meditation, Multitasking and Dual-System Processing, Depression, Working Memory

Education:

M.Sc. Psychology, University of Western Ontario, London, ON, CA, (Expected) 2015 – 2017
B.A. Honours Psychology, Algoma University, Sault Ste. Marie, ON, CA 2011 – 2015

Thesis:

Hatherley, J., (2017). Attentional preference after a short mindfulness meditation intervention (M.Sc. Dissertation). Western University, London, ON, CA. (Undergoing)

Hatherley, J., (2015). Multitasking between cognitive modules (B.A. Honours Dissertation). Algoma University, Sault Ste Marie, ON, CA.

Employment:

Graduate Teaching Assistant, University of Western Ontario 2015 – Present
Research Assistant, University of Western Ontario 2015 – Present
Scribe, Algoma University 2012 – 2013

Presentations:

Hatherley, J. (2017). Attentional preference after a short mindfulness meditation intervention. *Canadian Society for Brain, Behaviour, and Cognitive Sciences Annual Meeting*, University of Regina, Sask., CA. - *Accepted, but unable to attend in person.*

Hatherley, J. (March 2015). Multitasking between cognitive modules (B.A. Thesis). *Thesis presented to the general public at the 28th annual Honours Psychology Conference*, Sault Ste. Marie, ON, CA.

Affiliations:

Counsellor, Society for Graduate and Post-Doctoral Studies,	2016 - Present
Graduate Student, University of Western Ontario	2015 – Present
Member, The Psychonomic Society	2015 – Present
Vice-Chair, Algoma University Psychology Club, Algoma University	2014 – 2015

Courses Taught:

Research Methods and Statistical Analysis in Psychology 2015 – Present

Graduate Teaching Assistant, Taught an Undergraduate Tutorial on Statistics and Methods in Psychological research.

Event Participation:

Attendee, Psychonomics 2016, Conference Nov. 17th – 20th 2016

Attendee, Psychonomics 2015, Conference Nov. 19th – 22nd 2015

Psychonomics is an organization of scientists who research mental phenomena using experimental neuroimaging, computational science and behavioural measures. Psychonomics 2015 was the annual meeting of the organization, where over 2,500 scientists from across the globe presented posters and lectures on their research.

Representative, Ontario General Meeting of Student Unions, Conference Nov. 22nd – 25th 2013

Engaged in a weekend of discussion over the relationship between students and Universities/Colleges as well as Federal and Provincial government funding.

Other Affiliations:

Member, University of Western Ontario Kendo Club	2015 – Present
Recording Secretary, Algoma University Student Union, Algoma University	2013 – 2015
Vice Chair, United Way Youth Empowerment Council	2009 – 2011