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One-Session Mindfulness Meditation: The Effects of Stress Anticipation

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One-Session Mindfulness Meditation: The Effects of Stress Anticipation

By

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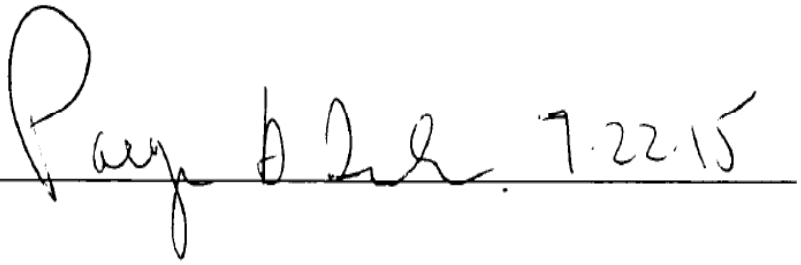
Paige H. Fisher, Ph.D.  7.22.15

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Table of Contents

List of Tables

Abstract

The current study concerns three main questions that are related to mindfulness meditation: the benefits of a brief preventative one-session mindfulness meditation, the effects of mindfulness meditation compared to a concentrative meditation, and correlations between rumination and stress when facing anticipated and unanticipated stressors. Type of meditation and whether or not participants could anticipate an upcoming stressor were varied in four conditions. Participants completed one 20-minute session of either mindfulness meditation or guided imagery meditation and were informed of a speech preparation task either before or after completing the meditation. Both one-session of mindfulness meditation and guided imagery meditation were able to reduce self-reported stress scores, but mindfulness was not more effective than guided imagery. There were no differences between conditions and neither meditation significantly reduced anxiety, rumination, heart rate, or blood pressure. These results indicate that one-session preventative mindfulness and guided imagery meditations may be equally beneficial in reducing stress. Moreover, the data supports the potential benefits of multiple therapeutic approaches when completing one-session of meditation, which might increase the range of individuals who can find positive benefits from these techniques.

Keywords: one-session meditation, mindfulness, guided imagery, stress, prevention

General Introduction

Meditation is the ability for one to engage in contemplation or reflection (Marchand, 2012). Meditation is a practice of mental silence in which stimulation of the mind is minimized, but an individual's overall levels of alertness and awareness are not diminished (Marchand, 2012). In general, meditation helps an individual develop self-regulation of thoughts and emotions in order to overcome psychological problems and enhance well-being (Sedlmeier et al., 2012). Meditation is found to be beneficial by reducing risk factors of stress, anxiety, negative emotions and neuroticism and can be employed in counseling and therapeutic settings (Brown et al., 2013; Lutz et al., 2008; Lykins & Baer, 2009; Nielsen & Kaszniak, 2006; Valentine & Sweet, 1999).

A form of meditation that has gained popularity is mindfulness. A central part of mindfulness training is learning to shift one's perspective to have present moment awareness through focusing attention on one's breath and to not be controlled by thoughts and emotions (Marchand, 2012). The current study investigates several questions related to mindfulness meditation: the benefits of a brief preventative one-session mindfulness meditation, the effects of mindfulness meditation compared to a concentrative meditation, and how rumination and stress are correlated when facing anticipated and unanticipated stressors. The variables of interest are stress, anxiety and rumination. Stress is a person's response of intense fear or helplessness when exposed to a traumatic event (American Psychiatric Association, 2013). Anxiety is characterized by excessive worry (American Psychiatric Association, 2013) and rumination is defined as distracting and repetitive thoughts (Jain et al., 2007).

When discussing meditation, there are numerous varieties of meditation and these differ in their use of attention, reasoning, visualization, and bodily awareness. Two primary styles of meditation are concentrative and mindfulness. Concentrative styles of meditation require the individual to draw attention to forcefully block or repress unwanted thoughts and feelings (Rossman, 2000). For example, guided imagery meditation has the individual direct their attention to a spiritual picture or phrase, known as a mantra, which will encompass the object of focus (Rossman, 2000). On the other hand, mindfulness meditation does not ask an individual to forcefully block out unwanted thoughts, but rather accept thoughts and emotions by focusing on the breath (Sedlmeier et al., 2012). Mindfulness is rooted in Buddhist tradition and has entered mainstream psychology within the past thirty years (Kabat-Zinn, 1990). In the Western world, mindfulness has gained recent popularity in the literature and one-session effects of mindfulness should be studied in order to determine how beneficial mindfulness may be in one therapeutic or counseling session (Brown et al., 2013). One formal meditation practice may have the power to cultivate mindfulness throughout the day (Brown et al., 2013; Hofmann, Sawyer, Witt, & Oh, 2010).

In the concentrative and mindfulness meditation literature, there are also three ways to discuss meditation interventions: the general effects of meditation without a stressor, recovery from stress, and the prevention of stress. Generally speaking, studies that do not include a stressor have found that meditation decreases blood pressure, stress, and anxiety (Sedlmeier et al., 2012). Much of the meditation literature examines the process through which meditation helps people cope with specific stressors. This can tell us more about the role of meditation in responding to life events or meditation's potential power as an intervention. Therefore, a number of studies have examined prevention before stressors or recovery after stressors. A prevention

study may examine how well an individual can prevent a reaction to a stressful event, while a recovery study will examine how an individual can recover from stress. Recovery and prevention can also be discussed hand-in-hand because as one must recover from high levels of depression, stress, rumination, or anxiety one must then prevent high levels of depression, stress, rumination or anxiety from recurring again (Teasdale, Seagal, & Williams, 1995). Recovery is vital in order to understand the need for prevention to protect health and well-being (Van Hoof & Bass, 2013). For instance, if one is not able to recover from stress this could lead to prolonged activation of one's stress systems which results in physical and mental impairment (Van Hoof & Baas, 2013). However, prevention can be used to inhibit physical and mental impairment from occurring in the first place (Teasdale et al., 1995). Prevention is established by reorganizing the necessary resources for the maintenance of processing information (Teasdale et al., 1995).

As a preview, this paper defines mindfulness meditation and different styles of concentrative meditations. Concentrative meditations and mindfulness meditations are separately discussed in regards to their ability to recover from stress and prevent stress. Stress, anxiety, rumination, heart rate, and blood pressure are variables that are addressed as well as the effects of whether or not one can anticipate an upcoming stressor. In essence, the purpose of this literature review is to provide support for the goals of the current study: to examine the benefits of a preventative one-session mindfulness meditation, the effects of mindfulness meditation compared to a concentrative meditation, and how rumination and stress are correlated when facing anticipated and unanticipated stressors. Concentrative meditations are first briefly discussed before examining the mindfulness meditation literature.

Concentrative Meditations – Introduction

Styles of concentrative meditation that can be compared to mindfulness mediation include guided imagery, transcendental meditation, and a clinically standardized meditation. Guided imagery meditation has participants create specific images within their mind, which positively correlate to physical and psychological indicators of well-being (Van Hoof & Baas, 2013). Core features of a guided imagery practice include sustaining attention on images during the present moment and non-reactively monitoring one's attention (Hart, 2008; Lutz et al., 2008). The Academy for Guided Imagery defined guided imagery as techniques that range from simple visualization to imagery-based suggestion by use of storytelling or metaphors (Bresler & Rossman, 2003). According to a review by Utay & Miller (2006), guided imagery is an established therapeutic tool that can be used in counseling settings, such as grief therapy, eating disorder therapy, and those surrounding identity issues. Similarly, transcendental meditation involves a systematic and continued focus of attention on a single target known as a mantra (Goleman & Schwartz, 1976). The focus of attention on a mantra has been an effective means of coping when faced with a threat (Goleman & Schwartz, 1976). Lastly, clinically standardized meditation is a form of mantra meditation in which participants are instructed to repeat their mantra mentally (Rausch, Gramling & Auerbach, 2006). Guided imagery, transcendental meditation, and clinically standardized meditation encompass concentrative techniques that direct attention in order to modify thought patterns and sensory experience (Marchand, 2012; Sedlmeier et al., 2012).

Concentrative Meditations – Recovery & Prevention

Concentrative meditations have been studied more extensively in the literature as one-session formats than mindfulness meditations (for examples see Van Hoof and Bass, 2013; Mohan, Sharma, and Bijlani, 2011). Because the general effects of such concentrative

meditations have been established (for example, Sedlmeier et al., 2012), this introduction focuses on examining recovery and prevention formats of concentrative meditations.

How do concentrative meditations work as stress-related prevention or recovery interventions? Van Hoof and Baas (2013) addressed how a single session of guided imagery meditation could be used a tool to recover from a stressful speech task. Recovery was operationally defined as an overall increase in subjective well-being. The results showed a stronger recovery from stress following meditation with mastery, relaxation, and motivation as mediators between the stress-reducing activity and recovery. On the other hand, Mohan and colleagues (2011) tested one-session of guided imagery meditation's ability to be both a recovery and prevention intervention. Meditation had more favorable effects in lowering stress responses when it *preceded* a stressful computer game than when it followed a stressful computer game. Therefore, prevention interventions of one-session of meditation may have a greater impact on stress reduction than recovery interventions (Mohan et al., 2011).

An additional way to examine meditation as a form of prevention is to investigate the prolonged anticipation of stressors, which may reveal how rumination, or intrusive, repetitive thoughts, can positively or negatively impact stress in different contexts. Morsella and colleagues (2010) examined how anticipation and expectation affects stress and cognitive styles. They tested whether participants would experience more intrusive cognitions about a future task that could enhance performance from using forethought to prepare, such as naming all 50 states in the United States of America. This was compared to conditions when participants anticipated no future task or a task that could not benefit from forethought, such as speed counting. A one-session concentrative exercise was used to focus on breathing and clearing the mind of excess thoughts. The experimental condition that involved naming all 50 states in America, reported

significantly more intrusive thoughts about the future task than the speed counting condition. This demonstrates that anticipated stressors may benefit from mental preparation and this mental preparation may in turn induce rumination when practicing meditation. This prolonged anticipation of a stressor may show that an increase in rumination is not necessarily considered negative. For instance, meditation may help reduce destructive negative thoughts, while increasing thoughts that help mentally prepare the individual to cope with a stressor. Therefore, the relationship between stress and rumination may vary in different contexts (Moresella et al., 2010).

An anticipatory coping response may also be observed when one can anticipate a stressor. An anticipatory coping response was often observed when comparing a meditation condition to another active treatment condition or control condition (Goleman & Schwartz, 1976; Rausch et al., 2006; Tang et al., 2007). When defining this anticipatory coping response, at first, the meditation condition had the lowest levels of stress right after completing a meditation. Second, the meditation condition then demonstrated the highest stress levels immediately before being faced with a stressor. However, after completing a second meditation, the participants in the meditation condition then experienced the greatest decreases in stress levels. This is suggested to be an anticipatory coping response that serves a purpose to better prepare an individual for stress. This anticipatory coping response has been found in concentrative styles of meditation and mixed styles of meditation that contain concentrative and mindfulness components. To the experimenter's knowledge, no previous research has revealed whether or not mindfulness meditation alone can provide evidence for an anticipatory coping response. (Goleman & Schwartz, 1976; Rausch et al., 2006; Tang et al., 2007)

Mindfulness Meditation – Introduction

As previously discussed, one focus of this study is to compare the effects of mindfulness meditation to a concentrative style of meditation. After reviewing the literature on concentrative meditations, mindfulness differs by not requiring an individual to forcefully block out unwanted thoughts and emotions, but rather accept unwanted thoughts and emotions in a non-judgmental manner (Sedlmeier, 2012). Mindfulness interventions also have an individual focus on their breath in order to assist in accepting unwanted thoughts and emotions (Sedlmeier, 2012). In the literature, mindfulness first entered mainstream psychology 25 to 30 years ago and stems from Buddhist philosophy (Malinowski, 2008). Buddhist philosophy describes mindfulness as an accepting and non-judgmental state of mind that can be developed through meditation (Malinowski, 2008). Within the past 10 years mindfulness has gained popularity as a meditation intervention in mainstream psychology (Malinowski, 2008). Kabat-Zinn (1990) developed a well-established mindfulness-based stress reduction (MBSR) program in order to combine Buddhist mindfulness with mainstream psychology. MBSR is a short-term 8-week program that consists of a seated meditation, bringing awareness to each area of the body, and completing yoga postures or asanas. Literature searches revealed that brief (three to five days and one-session) formats are dominant in the concentrative literature, while short-term and long-term formats (greater than 5 days) are primarily dominant in the mindfulness literature. The brief mindfulness formats that are currently present in the literature base their meditation formats on Kabat-Zinn's MBSR programs (for examples see: Johnson, Gur and David, 2013; Zeidan et al., 2010a; Zeidan et al., 2010b).

Bishop and colleagues (2004) reached a consensus on a two-component classification for the concept of mindfulness in hopes of establishing an operational definition. First, mindfulness is defined as the self-regulation of attention. This is a metacognitive skill, which involves the

inhibition of elaborative thought processes. Second, mindfulness is defined as an orientation to experience, which is a process of gaining insight into the nature of one's thought pattern and the adoption of a de-centered outlook. A de-centered outlook encompasses that thoughts and feelings are a subjective experience and do not hold a permanent cognitive structure. The development of a de-centered outlook also works by embracing a fundamental psychological mechanism of shifting one's perspective (Marchand, 2012). Brown and Ryan (2003) further expand this idea by describing mindfulness as a quality of consciousness characterized by clarity and flexibility of attention and non-judgmental awareness. (Bishop et al., 2004)

In reviewing how mindfulness can help one develop a de-centered outlook, one can begin to see why mindfulness in counseling gained popularity in the early 1990s as a way of cognitively restructuring ones negative thought processes. For example, Segal, Williams, and Teasdale (2002) introduced mindfulness-based cognitive therapy (MBCT) as a form of prevention for depression relapse. In MBCT, counselors work to direct their clients' attention on the breath in order to serve as an anchor for their sensory awareness while they quietly observe whatever thoughts and sensations arise without reacting to or judging them. This sense of non-reactivity is a core concept that aids in one's ability to use mindfulness in counseling in order to re-perceive and be less identified with one's thoughts and emotions (Brown, Marquis, and Guiffrida, 2013; Shapiro et al., 2006).

Mindfulness is often discussed in terms of only recovery, or only prevention (Malinowski, 2008). While many variables are examined when looking at mindfulness, two of the most common variables are mood and cognitive processes. Stress, anxiety, cognition, and rumination are significantly addressed here as factors that affect well-being. It is also widely considered that rumination may play a role in affecting stress and anxiety levels (Jain et al.,

2007). For example, Jain and colleagues (2007) found that both stress and rumination decreased after practicing mindfulness meditation for one month. (Jain et al., 2007)

This paper will mainly address brief and short-term mindfulness meditation formats with a focus on general effects of brief mindfulness, recovery and prevention. Brief and short-term formats are often based off of long-term formats. A traditional mindfulness practice from the Buddhist culture is considered long-tem as it encompasses developing an enduring mindful and spiritual lifestyle (Marchand, 2012). Kabat-Zinn's (1990) establishment of mindfulness-based stress reduction (MBSR) programs are 8-weeks in length and often considered short-term by mainstream psychology (Chiesa & Serretti, 2010). In essence, this paper operationalizes that an everyday mindful lifestyle through everyday mindfulness meditation is considered a long-term practice, a short-term practice consists of any mindfulness interventions that are greater than five days, and a brief practice is three to five days, or one-session of mindfulness meditation. Taking into account the frequency and length of a mindfulness meditation may shed light on the underlying mechanisms of how and why mindfulness meditation works to help individuals overcome psychological and emotional problems.

Mindfulness Meditation – The Effects Of Brief Mindfulness

An important area of research is the amount of mindfulness training needed to impact on an individual's stress and rumination. For instance, Sedlmeier and colleagues (2012) conducted a global meta-analysis on both concentrative and mindfulness meditation to inspect long-term and short-term meditations' ability in helping individuals achieve a calming effect of both body and mind. Overall, it was found that both long-term and short-term meditation have a substantial impact on psychological variables and such impact may be stronger for negative emotional variables than cognitive variables (Sedlmeier et al., 2012). However, the ideal frequency and

length of practice in the long-term, short-term and brief mindfulness meditation literature are still largely undetermined. Keune and Fortinos (2010) investigated the relationship between the length and frequency of a mindfulness practice and found there was no significant relationship between session duration (10 min – 30 min) and frequency of practice (one time a week – three times a week). As the ideal frequency and length of a mindfulness practice is largely undetermined, there is a need for brief one-session effects to be examined in order to determine the extent to which a single session of mindfulness can be beneficial in a therapeutic or counseling setting (Brown et al., 2013).

Few studies have examined brief formats with three to five days or a one-session duration (Johnson et al., 2013; Zeidan et al., 2010a; Zeidan et al., 2010b). These studies did not induce stress and administered measures directly before and after a meditation in order to assess what meditation can do for us as a general event in our everyday lives. Zeidan and colleagues (2010a) examined whether 4 days of mindfulness meditation affects behavioral markers on cognition and mood, such as working memory, stress, and anxiety. They discovered that inexperienced meditators learning mindfulness experience similar benefits on working memory tasks when compared to long-term meditators. Mindfulness meditation did not reduce stress, but training did reduce fatigue and anxiety, and reductions in these mechanisms may be why there was an improvement on working memory tasks (Zeidan et al., 2010a).

Two studies have also investigated brief mindfulness in a more sophisticated way by also having a sham mindfulness meditation (sham M) condition. A sham M differs from a mindfulness condition because guided instructions are not given to participants, such as focusing on the flow of breath (Johnson et al., 2013; Zeidan et al., 2010b). Such instruction is imperative in the mindfulness condition and allows the sham M to act as a manipulation check. Contrary to

the findings of Zeidan and colleagues (2010a), the mindfulness intervention in the later study by Zeidan et al. (2010b) had the strongest effect of reducing scores on stress subscales, specifically tension, fatigue, depression, and confusion when compared with sham M. The mindfulness and sham M conditions significantly reduced participants' anxiety compared to the control condition. Lastly, the mindfulness condition did not significantly lower blood pressure when compared to the sham M and control condition.

To the experimenter's knowledge, Johnson and colleagues (2013) are one of the few researchers to study only a 20-minute comprehensive one-session mindfulness meditation instead of short-term or long-term mindfulness meditation. These researchers used measures that were effective for three days of mindfulness meditation in order to see if similar effects can be present after just one-session of mindfulness meditation (see Zeidan et al., 2010b). The results show that one-session of mindfulness was not sufficient to affect performance on working memory tasks. However, after one session of mindfulness and sham M there was a significant positive effect on mood. Participants in both mindfulness conditions reported decreased tension, confusion, and total distress. This indicates that the sham M was not adequately different from mindfulness to distinguish effects after one session, but that both mindfulness and sham M had the power to reduce stress after one-session.

Mindfulness Meditation – Recovery & Prevention

Arch & Craske (2006) found that mindful individuals are less likely to view a demanding situation as stressful. These researchers used a breathing focused condition that modeled the effects of mindful breathing instructions in order to facilitate recovery. A one-session mindful breathing exercise was compared to the effects of unfocused attention and worry. Focused breathing is a form of light mindfulness and is not a true mindfulness meditation (Arch &

Craske, 2006). Participants in the focused breathing condition were the most stable and least emotionally volatile when viewing negative pictures. The lower reported aversive affects and the trend for greater willingness to view more negative pictures demonstrates that the participants in the focused breathing condition could be viewed as more adaptive in responding to negative stimuli. Thus, the light mindfulness training is linked to a faster recovery or less reactivity after exposure to negative pictures that caused stress. Overall, Arch and Craske demonstrated that mindful individuals are less likely to view an aversive situation as stressful.

In investigating the overall ability to mindfully meditate Chambers, Lo and Allen (2007) examined the effects of brief, but intensive, mindfulness training as a prevention intervention before the experience of everyday stressors. Participants were tested on overall mindfulness and rumination seven to ten days after the training ended, by which time participants had readjusted to their daily routines and experienced everyday stressors. The benefits of this training were reported as enhanced overall mindfulness, with reduced depressive symptoms, reflective rumination, and negative affect. Importantly, increased levels of mindfulness were correlated to decreased levels of rumination.

Similarly, Jain and colleagues (2007) also showed that a short-term preventative mindfulness meditation could be unique in its ability to reduce rumination. The researchers found that mindfulness could decrease distress, but decreases may also be related to reductions in rumination. After Jain and colleagues' participants completed the mindfulness intervention, rumination and distracting thought measures were collected one to two weeks after, right before the students took final exams. The short-term mindfulness meditation acted as a form of stress and rumination prevention for students who were about to take finals. Thus, the decreases in distracting and ruminating thoughts were present in times of high stress and after participants

finished the intervention. In essence, the decrease in rumination correlated to the decrease in stress (Jain et al., 2007).

Mindfulness as a form of prevention may also be used to normalize the patterns of information processing or rumination that become active in negative affect (Teasdale et al., 1995). This includes altering the response tendency from viewing a stressor as intolerable to something that can be tolerated (Lotan, Tanay, & Bernstein, 2013). The development of an alternative positive and detached thought pattern may further show that rumination can potentially play a role in changing the meaning of an aversive experience. Lotan and colleagues (2013) and Tanay, Lotan, & Bernstein (2012) demonstrated that a mindfulness practice may also promote greater self-efficacy in coping with distress, which include greater willingness to experience distress. Moreover, Jislin-Goldberg, Tanay, & Bersetin (2012) expanded upon Tanay and colleagues' preventative intervention and discovered that the development of mindfulness can protect or buffer from experimental effects of stress. This further shows how mindfulness meditation can be used as prevention in which mood, anxiety, and rumination are mutually targeted and changed. (Jislin-Goldberg et al.; Tanay et al.).

Another issue in prevention is whether a stressor is anticipated or not. Anticipation of a stressor can induce additional cognitive and attentional demands. In the concentrative meditation literature, Morsella and colleagues (2010) found that anticipated stressors could induce mental preparation, which may in turn alleviate negative effects of stress. Years prior, Valentine and Sweet (1990) also examined anticipation effects of stressors on cognitive styles. Valentine and Sweet tested if mindfulness meditators would show superior performance, relative to concentrative meditators, when a stimulus was anticipated versus unanticipated. Mindfulness meditators demonstrated a superior performance than concentrative meditators when there was

an unanticipated stimulus during the Wilkin's Counting Test (from Wilkin et al., 1987). This is explainable in terms of Posner and Snyder's (1975) theory that focused attention is impaired when a stimulus is unexpected, but operational when a stimulus is expected. It appears that shifting to an unexpected stimulus makes additional attentional demands. This suggests that the development of flexibility of attention may be as important as selective attention for mindful meditators (Posner & Snyder, 1975). This adds support to the idea that mindfulness may be better at impacting positive change through a non-judgmental attitude in a counseling setting when compared to concentrative styles of meditation (Baer, 2003; Brown et al., 2013).

Summary

When there is an introduction of a stressor, it appears that the impact of mindfulness seems to be different on mood and cognitive variables in recovery and prevention interventions. For instance, prevention formats show a decrease in rumination scores that may correlate to a decrease in stress scores, (Jain et al., 2007). In addition, recovery formats demonstrate that mindfulness may allow an individual to experience an aversive situation as less stressful (Arch and Craske, 2006). As the frequency and length of mindfulness is still largely undetermined, brief sessions of mindfulness, especially one-session of mindfulness, need to be further explored in order to understand the extent to which mindfulness is useful in one therapeutic or counseling session (Brown et al., 2013). Furthermore, the concentrative meditation literature established that prevention may produce greater benefits than recovery (Mohan et al., 2011), that an increase in rumination during the anticipation of a stressor may not have a negative effect (Morsella et al., 2010), and that an anticipatory coping response needs to be examined in the mindfulness literature (Goleman & Schwartz, 1976; Rausch et al., 2006; Tang et al., 2007). Given the incongruent information within the concentrative and mindfulness meditation literature, the

current study investigated one-session of mindfulness meditation and guided imagery meditation in a prevention format while addressing how rumination and stress are correlated when facing anticipated and unanticipated stressors.

Current Study

The current study addresses three main questions. The first question examines if one-session of a preventative mindfulness meditation is beneficial, especially if one-session can have an impact on people's stress response. Second, this study compares the effects of mindfulness meditation to guided imagery mediation. Last, the link between stress and rumination is examined to see if they are equally reduced. There were four conditions: two mindfulness meditation conditions and two concentrative meditation conditions with anticipation of stressor varied. Guided imagery was chosen as a form of concentrative meditation. All four conditions received a stressor (being told they would have to give a speech) after the meditation. Two of the groups were informed of the speech prior to meditating while the other two were not informed until after meditating. The mindfulness meditation and anticipated stress condition (MM Ant) and the guided imagery and anticipated stress condition (GI Ant) were informed of the speech task before completing a 20-minute meditation. One the other hand, the mindfulness meditation and unanticipated stress condition (MM No Ant) and the guided imagery and unanticipated stress condition (GI No Ant) were not told about the speech until after completing a 20-minute meditation.

The first hypothesis of the current study tested to see if a brief one-session preventive mindfulness meditation would be effective at reducing stress, anxiety, and rumination. To date, literature searches revealed that Johnson and colleagues (2013) developed the only comprehensive one-session 20-minute mindfulness meditation. While the mood measures in

Johnson and colleagues' protocol were affected, the rumination measures were not significantly affected. The current study expands Johnson and colleagues' protocol to include a stress manipulation. It is hypothesized that the introduction of a stress manipulation can induce additional working memory demands that can significantly affect rumination. The current study is also a prevention format based on Mohan and colleagues' (2011) evidence that prevention interventions of meditation may have greater outcomes than recovery interventions of meditation. This addresses a current lack of information in the literature by examining whether a one-session mindfulness meditation in a prevention format will have positive effects. It is expected that the results will show support for the effectiveness of a one-session prevention mindfulness meditation.

The second hypothesis of the current study tested to see if one preventative session of mindfulness meditation is more effective than guided imagery meditation, a form of concentrative meditation. To the experimenter's knowledge, the two meditations have never been studied together in a one-session format and predictions are made from prior literature on shorter and longer session formats (Sedlmeier et al., 2012). It is hypothesized that mindfulness meditation will be more effective than guided imagery meditation at reducing behavioral and physiological stress, anxiety, and rumination. The rationale for this prediction is that mindfulness focuses on shifting one's perspective to allow individuals to be less identified with their thoughts (Marchand, 2012). An individual who is practicing mindfulness will learn to embrace all stimulation that may arise, which can lead to a sense of autonomy as one experiences not having to control or be controlled by thoughts and emotions (Kostanski & Hassed, 2008). On the other hand, guided imagery requires an individual to exhibit some control over their senses in order to create specific images within their mind (Van Hoof & Baas, 2013). Kabat-Zinn (1990), founder

of mindfulness-based stress reduction programs, holds the stance that imagery needs to be rooted in a non-doing and non-striving larger context in order to be effective for healing. As mindfulness also promotes creating a sense of autonomy about one's thoughts and emotions (Kostanski & Hassed, 2008), it is predicted that one-session of mindfulness meditation is more effective than guided imagery meditation. Moreover, as mindfulness meditation focuses on non-judgmental awareness, this may make the individuals who might struggle with embracing meditation more receptive to the intervention (Bishop et al., 2004).

The third hypothesis is exploratory in examining the relationships between stress and rumination by looking at prolonged stress anticipation. For instance, the mindfulness meditation anticipation condition will have a prolonged anticipation of a stressor for 20-minutes throughout the meditation while the mindfulness meditation no anticipation condition will not be able to anticipate the upcoming stressor throughout the meditation. Based on Valentine and Sweet's (1990) finding that mindful meditators handle unanticipated stimuli better than concentrative meditators, the present study aims to compare the effects of unanticipated stimuli within mindful meditators. The current study explores if the prolonged anticipation of a stressor decreases stress, but increases rumination. As the anticipation of a future task could benefit from mental preparation (Morsella et al., 2010), an increase of rumination may be helpful in this respect. In summary, the hypotheses of the current study will be tested in a one-session preventative mindfulness or guided imagery meditation format to shed light on how an anticipated and unanticipated stress manipulation can affect the relationship between stress and rumination.

Method

Participants

Participants were undergraduate students who were recruited from Seton Hall University and participated in the study in exchange for course credit. The recruitment took place through the Sona System. Participants received 1 experimental credit as compensation for their involvement in the study. An a priori power analysis revealed that given a small to medium effect size (d = .25), 180 participants would be needed with a power of 0.80 with an alpha of 0.05. Due to constraints of the study, there were a total of 116 participants in which 80 identified as female, 24 identified as male, and 12 did not disclose. Participants also had a modal age of 19 and sophomore was the modal grade level.

Materials

The Freiburg Mindfulness Inventory (FMI)

The FMI (Walach et al., 2006) is a 14-item assessment that measures one's experience of mindfulness. An example of a statement is, "I am open to experiences of the present moment." Statements are then rated on a 4-point scale. Higher scores indicate a greater ability to engage in a mindful state. Participants completed the FMI at baseline. This 14-item assessment is semantically robust and psychometrically stable with a Cronbach's alpha of 0.86 (Walach et al., 2006).

The Profile of Mood States (POMS)

The POMS (McNair, Loor and Droppleman, 1971) is a 65-item inventory checklist that measures total mood disturbance on a 5-point scale. The higher the score the greater increase in mood disturbance. A total mood disturbance score is calculated through six subscales: tension, depression, confusion, fatigue, anger and vigor. The POMS is used at baseline and at the end of the experiment to measure within and across groups (Johnson et al., 2013; Zeidan et al., 2010b).

According to Johnson and colleagues (2013) the alpha coefficient for tension is 0.85, for depression 0.87, for anger 0.94, for vigor 0.88, for fatigue 0.89 and for confusion 0.83.

State-Trait Anxiety Inventory (STAI), Form Y-state version

The STAI (Spielberger, 1983) consists of 20 statements about how participants feel at the present moment rated on a 4-point scale. Only the State portion of the measure was used in this study. An example of a sample item is "I lack self confidence." A high score indicates a high level of state anxiety. The STAI is currently used at baseline and at the end of the experiment to compare anxiety levels within and across conditions. According to Johnson and colleagues (2013) and Rausch and colleagues (2006) the STAI's Crobach's alpha is reported to be greater than 0.90.

Repetitive Thought Questionnaire (RTQ and RTQ2)

The RTQ and RTQ2 (Feldman et al., 2010) ask participants to answer twenty questions regarding the frequency of repetitive thoughts (RTQ) and negative reactions to such thoughts (RTQ2) during the study. The frequency of repetitive thoughts is scored on a 4-point scale from "never" to "almost constantly." The negative reactions to repetitive thoughts are scored on a 4-point scale from "slightly or not at all" to "extremely." The higher the score indicates more repetitive thoughts and the greater the negative reaction to repetitive thoughts. The RTQ was completed at the end of the experiment to compare across groups. The RTQ has demonstrated high internal consistency with a Cronbach's alpha of 0.85 and the RTQ2 has demonstrated an acceptable internal consistency of 0.70 (Feldman et al., 2010).

Blood Pressure (BP)

Blood pressure was measured through the use of an electric blood pressure monitor at baseline and at the end of the experiment to compare within and across groups. Participants were

informed of their blood pressure and were given an information packet that describes high versus low blood pressure.

Heart Rate (HR)

Heart rate was also measured through the use of an electric blood pressure monitor at baseline and at the end of the experiment to compare within and across groups. Participants were informed of their heart rate and were given an information packet that describes high versus low heart rate.

Demographic Questionnaire

The experimenter created the demographic questionnaire in order to acquire background information about the participants. This questionnaire was completed at the end of study and asked participants to identify their age, gender, grade level, how much previous meditation experience they had, if they believed they were truly meditating, if any of the lab equipment made them nervous or anxious, and if they are comfortable with public speaking. Averages from each question are provided as descriptive participant data.

Mindfulness Meditation

The 20-minute mindfulness meditation is adopted from Johnson and colleagues' (2013) protocol. Participants completed the meditation seated in a chair while audio instructions were played through a PC computer.

Guided Imagery Meditation

The 20-minute guided imagery meditation is adopted from Rossman's (2000) protocol. Participants completed the meditation seated in a chair while audio instructions were played through a PC computer.

Procedure

The study was completed in a single session. Participants completed the study individually in private rooms. After completing an informed consent form, participants were placed in one of four conditions: MM Ant, GI Ant, MM No Ant, GI No Ant. In the MM Ant and GI Ant condition, participants were informed about the stressor before completing a mindfulness or guided imagery meditation. In the MM No Ant and GI No Ant condition, participants were not informed of the stressor until after they completed their mindfulness or guided imagery meditation. All participants, regardless of condition, completed baseline measures: Freiburg Mindfulness Inventory (FMI), Profile of Mood States (POMS), State – Trait Anxiety Inventory (STAI), blood pressure (BP) and heart rate (HR).

The stressor that the participants did or did not anticipate was Belcher & Peters' (2009) speech preparation task. All participants were told that they would have 5-minutes to prepare a 5-minute speech about their psychology experience at Seton Hall University (Belcher & Peters, 2009). Participants were informed that the speech would be video recorded and that their video would be submitted to a panel of three professors to be judged and analyzed. Participants were given a blank sheet of paper and a pen to prepare their speech. A video camera was present in the room while participants were preparing their speech. After participants prepared the speech they completed the second and final round of measures: Profile of Mood States (POMS), State-Trait Anxiety Inventory (STAI), Repetitive Thoughts Questionnaire (RTQ and RTQ2), blood pressure (BP) and heart rate (HR). After preparing the speech and completing the final measures participants were informed that they did not have to actually present their speech. All participants completed a demographics questionnaire to collect background information. Last, all subjects were debriefed at the end of the experiment so that they were aware of the true nature of the experiment and speech preparation task.

Demographics

Demographic data revealed that 55% of participants had previous meditation experience prior to completing the current study. This previous meditation experience ranged from practicing meditation one time within the past five years to having a weekly meditation practice. Additionally, a fidelity check was used in which the researchers asked participants at the end of the study if they thought they were truly meditating. Sixty-eight percent of participants indicated that they believed they were truly meditating. As the goal of the speech task was to induce stress for the participants, the researchers were curious if stress was induced from other components within the study design. Approximately, 65% of participants reported that the lab equipment (blood pressure machine, camera, etc.) created feelings of nervousness. These feelings of nervousness may or may not have affected participants' stress levels. Last, 49% of participants reported that they were comfortable with public speaking. This potentially indicates that the speech preparation task did not induce sufficient stress in each participant as about half entered the study being comfortable with public speaking.

Results

This study used a repeated measures design and had a total of four conditions: two mindfulness meditation conditions (MM Ant and MM No Ant) and two guided imagery conditions (GI Ant and GI No Ant). Participants completed pre and post anxiety (STAI), stress (POMS), blood pressure (systolic and diastolic) and heart rate (HR) measures. Before analyzing the data, we conducted independent t-tests to determine if there were any pre measure differences between the conditions as this could potentially bias the data. All conditions were compared to one another.

There were no differences between conditions on any of the baseline measures (STAI, HR, BP, FMI), except the POMS (see Table 1 for all means, standard deviations, standard error means, confidence intervals, significance levels, and effect sizes for each independent t-test). Participants could score anywhere between 0-325 on the 65-item POMS measure. When comparing the anticipation conditions, GI Ant to MM Ant, participants in the GI Ant condition started off about 18 points higher on the pre POMS measure than the MM Ant condition. Similarly, the GI Ant condition started off about 21 points higher on the pre POMS measure when compared to the MM No Ant condition. In both of these independent t-tests, the GI Ant condition had significantly higher pre POMS scores (see Table 1 for pre POMS means). Therefore, participants in the GI Ant condition started off the study in a more distressed state than the two other conditions. There was no significant difference between initial distress level in the GI No Ant condition when compared to any of the other conditions.

Table 1. *Baseline Differences by Measure*

POMS	Condition Pairs	Mean	Std. Deviation	Std. Error Mean	95% CI (Lower, Upper)	Effect Size *(d)*
	MM Ant	80.516	28.129	5.0522	(-13.89, 19.922)	0.094
	MM No Ant	77.5	36.532	6.904		
	GI Ant	98.714	39.908	7.556	(-4.47, 34.687)	0.421
	GI No Ant	83.607	32.745	6.188		
	GI Ant	98.714	39.98	7.556	(.313, 36.083)	.541*
	MM Ant	80.516	28.129	5.052		
	GI No Ant	83.607	32.745	6.188	(-5.686, 6.543)	0.179
	MM No Ant	77.5	36.532	6.903		
	GI No Ant	83.607	32.745	6.188	(-12.782, 18.964)	0.104
	MM Ant	80.516	28.129	5.052		

	GI Ant	98.714	39.98	7.556	(.695, 41.734)	.445*
	MM No Ant	77.5	36.532	6.904		

STAI	Condition Pairs	Mean	Std. Deviation	Std. Error Mean	95% CI (Lower, Upper)	Effect Size *(d)*
	MM Ant	42.688	11.451	2.024	(-4.197, 7.215)	0.138
	MM No Ant	41.179	10.492	1.983		
	GI Ant	43.179	9.1	1.72	(-4.215, 7.358)	0.148
	GI No Ant	41.607	12.264	2.318		
	GI Ant	43.179	9.1	1.72	(-4.908, 5.89)	0.048
	MM Ant	42.688	11.45	2.024		
	GI No Ant	41.607	12.264	2.318	(-5.686, 6.543)	0.038
	MM No Ant	41.179	10.492	1.983		
	GI No Ant	41.607	12.264	2.318	(-7.211, 5.051)	0.092
	MM Ant	42.688	11.451	2.024		
	GI Ant	43.179	9.1	1.72	(-3.262, 7.262)	0.207
	MM No Ant	41.179	10.492	1.983		

HEART RATE	Condition Pairs	Mean	Std. Deviation	Std. Error Mean	95% CI (Lower, Upper)	Effect Size *(d)*
	MM Ant	77.167	16.14	2.947	(-4.647, 10.465)	0.201
	MM No Ant	74.258	13.256	2.381		
	GI Ant	74.667	9.407	1.92	(-8.495, 9.290)	0.026
	GI No Ant	74.269	19.681	3.86		
	GI Ant	74.667	9.407	1.92	(-9.571, 4.572)	0.205
	MM Ant	77.167	16.14	2.947		
	GI No Ant	74.269	19.681	3.859	(-8.777, 8.799)	0
	MM No Ant	74.258	13.256	2.381		
	GI No Ant	74.269	19.681	3.86	(-12.495, 6.7)	0.165
	MM Ant	77.167	16.14	2.947		
	GI Ant	74.667	9.407	1.92	(-5.995, 6.812)	0.036

	MM No Ant	74.258	13.256	2.381		

Systolic BP	Condition Pairs	Mean	Std. Deviation	Std. Error Mean	95% CI (Lower, Upper)	Effect Size (*d*)
	MM Ant	108.2	11.848	2.163	(-5.765, 6.746)	0.042
	MM No Ant	107.71	12.544	2.253		
	GI Ant	108.458	14.056	2.87	(-6.774, 7.075)	0.012
	GI No Ant	108.307	10.118	1.984		
	GI Ant	108.458	14.059	2.87	(-6.816, 7.332)	0.02
	MM Ant	108.2	11.848	2.163		
	GI No Ant	108.308	10.118	1.984	(-5.533, 6.73)	0.052
	MM No Ant	107.71	12.544	2.252		
	GI No Ant	108.308	10.118	1.984	(-5.845, 6.06)	0.01
	MM Ant	108.2	11.848	2.163		
	GI Ant	108.458	14.059	2.87	(-6.462, 7.96)	0.058
	MM No Ant	107.71	12.544	2.253		

Diastolic BP	Condition Pairs	Mean	Std. Deviation	Std. Error Mean	95% CI (Lower, Upper)	Effect Size (*d*)
	MM Ant	69.433	8.324	1.52	(-3.969, 4.062)	0.006
	MM No Ant	69.388	7.333	1.317		
	GI Ant	69.792	8.22	1.678	(-8.073, 3.041)	0.262
	GI No Ant	72.308	10.994	2.156		
	GI Ant	69.791	8.22	1.678	(-4.192, 4.907)	0.044
	MM Ant	69.433	8.324	1.52		
	GI No Ant	72.308	10.994	2.156	(-1.972, 7.813)	0.322
	MM No Ant	69.387	7.333	1.317		
	GI No Ant	72.308	10.994	2.156	(-2.311, 8.06)	0.303
	MM Ant	69.433	8.324	1.52		
	GI Ant	69.792	8.22	1.678	(-3.811, 4.620)	0.052
	MM No Ant	69.388	7.333	1.317		

* = $p < .05$, ** = $p < .01$

As baseline differences were found for the GI Ant condition, change scores were used for all of the dependent variables completed at baseline and post intervention (POMS, STAI, HR, BP). Change scores were calculated by subtracting the post score from the pre score. Positive change score numbers represent the direction that was hypothesized, which symbolizes a reduction in stress, anxiety, heart rate or blood pressure. For instance, a post STAI score of 20 subtracted from a pre STAI score of 30, gives a change STAI score of 10. Using these change scores, the following analyses were conducted on the POMS, STAI, HR, and BP. The measures are discussed in two separate sections regarding behavioral and physiological effects. First, we examined within intervention effects to test if each condition was effective in lowering stress, anxiety, heart rate or blood pressure. One-sample t-tests were used to see if change scores for each measure were different from no change (as indicated by a test value of 0). If these one-sample t-tests were significant, then the data was followed-up with an ANOVA to examine between group differences. In essence, an ANOVA was used to compare between conditions to see if one condition was more influential or powerful than the other conditions. If the one-sample t-tests were not significant, it was then inferred that there were no main effects of the intervention and there were no between group differences.

Behavioral Measures

The behavioral measures included two self-reported stress and anxiety questionnaires: the POMS and the STAI. Analyses of the POMS total change scores indicate that all four conditions significantly reduced stress (MM Ant $t(30) = 3.177$; MM No Ant $t(27) = 3.785$; GI Ant $t(27) = 4.65$; GI No Ant $t(27) = 2.24$) with all p values $< .034$ and all Cohen's d effect sizes $> .863$ (see

Table 2 for all POMS change scores' means, standard deviations, standard error means, confidence intervals, significance levels, and effect sizes).

Table 2: *POMS Change Scores By Condition*

Condition	Mean Change	Std. Deviation	Std. Error Mean	95% CI (Lower, Upper)	Effect Size (*d*)
MM Ant	12.484	21.881	3.93	(4.577, 20.510)	1.161**
MM No Ant	8.929	12.484	2.359	(4.088, 13.769)	1.458**
GI Ant	19.429	22.107	4.178	(10.857, 28.001)	1.79**
GI No Ant	9.643	22.798	4.309	(.802, 18.483)	0.863*

* = $p < .05$, ** = $p < .01$

A follow up 2 (meditation: mindfulness or guided imagery) x 2 (stress anticipation: participants anticipate the stressor or participants do not anticipate the stressor) ANOVA with total POMS change scores as the dependent variable was used to examine if there were between group differences. This two factor ANOVA did not show a significant main effect for the type of meditation factor $F(1, 111) = 1.02$, $p = .315$, $n_p^2 = .009$ and did not show a significant main effect for the anticipation factor $F(1, 111) = 3.09$, $p = .081$, $n_p^2 = .027$. Moreover, the interaction between type of meditation and whether or not the participants were able to anticipate the speech preparation task was not significant, $F(1, 111) = .675$, $p = .413$, $n_p^2 = .006$. In essence, there were no differences in the reduction of stress between groups, regardless of condition. All conditions significantly reduced total stress change scores and all conditions were equally effective in doing so. Therefore, mindfulness meditation is not more effective than guided imagery meditation in reducing overall stress. The role of stress anticipation is also not a significant factor in how effective each meditation is in reducing overall stress, which is contrary to our predictions.

The STAI change score is the second measure to be examined and assessed one's overall self-reported anxiety. One-sample t-tests were used to examine within groups differences. The STAI change scores were not statistically significant for any condition with all p values > .253 and all Cohen's d effect sizes < .449 (see Table 3 for all STAI change scores' means, standard deviations, standard error means, confidence intervals, significance levels, and effect sizes). In essence, no condition was effective in reducing self-reported state anxiety. In seeing that there was not a significant reduction in anxiety, the results were not followed up with a 2x2 ANOVA. As none of the interventions reduced anxiety, mindfulness meditation is not more effective than guided imagery in impacting anxiety. The role of stress anticipation is also not a significant factor in how effective each meditation is in reducing anxiety, which is contrary to our predictions.

Table 3: *STAI Change Scores By Condition*

Condition	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size (*d*)**
MM Ant	1.156	12.232	2.162	(-3.234, 5.566)	0.193
MM No Ant	0.786	7.421	1.402	(-2.092, 3.66)	0.215
GI Ant	1.286	10.818	2.044	(-2.909, 5.48)	0.242
GI No Ant	-2.964	13.423	2.537	(-8.169, 2.241)	0.449

* = $p < .05$, ** = $p < .01$

Physiological Measures

The physiological measures included two physical responses to stress and anxiety questionnaires: heart rate and blood pressure. Change in heart rate is the third measure to be examined by one-sample t-tests. The heart rate mean change score in the MM Ant condition (M = 3.03) was significantly different from no change $t(29) = 2.30$, $p = .029$, 95% CI [.34, 5.73] with a large-sized effect, $d = .855$. MM No Ant, GI Ant, and GI No Ant were not effective in

reducing heart rate change scores (see Table 4 for all heart rate change scores' means, standard deviations, standard error means, confidence intervals, significance levels, and effect sizes). As the MM Ant condition was the only condition that impacted heart rate from pre to post intervention, it would follow that a 2 (meditation: mindfulness or guided imagery) x 2 (stress anticipation: participants anticipate the stressor or participants do not anticipate the stressor) ANOVA would be significant based on the differences between the MM Ant and the other three conditions. This two factor ANOVA did not show a significant main effect for the type of meditation factor $F(1, 100) = 1.217$, $p = .273$, $n_p^2 = .012$ and did not show a significant main effect for the anticipation factor $F(1, 100) = .146$, $p = .704$, $n_p^2 = .001$. Moreover, the interaction between type of meditation and whether or not the participants were able to anticipate the speech preparation task was not significant, $F(1, 100) = .126$, $p = .723$, $n_p^2 = .001$.This indicates that the MM Ant condition did not impact HR differently than the other 3 conditions. Due to the failure to find significance when using an ANOVA to examine differences between conditions, the MM Ant condition's significant reduction in heart rate according to a one-sample t-test should be interpreted with caution.

Table 4: *Heart Rate Change Scores By Condition*

Condition	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size *(d)***
MM Ant	3.033	7.213	1.317	(.34, 5.727)	0.855*
MM No Ant	1.259	9.638	1.855	(-2.553, 5.072)	1.458
GI Ant	-0.478	9.746	2.032	(-4.693, 3.736)	1.79
GI No Ant	-0.542	19.669	4.015	(-8.847, 7.764)	0.056

* = $p < .05$, ** = $p < .01$

Finally, blood pressure was examined by a one-sample t-test. Blood pressure was examined in two categories: systolic and diastolic. In all conditions, both systolic and diastolic blood pressure scores were not statistically significant from no change with all p values > .124 and all Cohen's d effect sizes < .588 (see Table 5 for all systolic blood pressure change scores' means, standard deviations, standard error means, confidence intervals, significance levels, and effect sizes; see Table 6 for all diastolic blood pressure change scores' means, standard deviations, standard error means, confidence intervals, significance levels, and effect sizes). In essence, no condition was effective in reducing blood pressure. In seeing that there was not a significant reduction in blood pressure, the results were not followed up with a 2x2 ANOVA. Contrary to our predictions, type of mediation practice and stress anticipation did not impact blood pressure.

Table 5: *Systolic Blood Pressure Change Scores By Condition*

Condition	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size *(d)***
MM Ant	-0.967	7.819	1.428	(-3.254, 1.953)	0.252
MM No Ant	-1.333	5.987	1.152	(-3.702, 1.035)	0.453
GI Ant	-0.261	8.131	1.695	(-3.777, 3.255)	0.066
GI No Ant	0.167	7.481	1.527	(-2.992, 3.326)	0.046

* = p < .05, ** = p < .01

Table 6: *Diastolic Blood Pressure Change Scores By Condition*

Condition	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size *(d)***
MM Ant	-1.933	6.68	1.212	(-4.428, .561)	0.588
MM No Ant	-2.148	10.737	1.066	(-6.396, 2.099)	0.408
GI Ant	-1.522	7.464	1.556	(-4.75, 1.706)	0.417
GI No Ant	-0.667	9.951	2.031	(-4.868, 3.535)	0.136

* = $p < .05$, ** = $p < .01$

Rumination

Rumination was the only measure examined post intervention, but not at baseline. The RTQ and RTQ2 self-reported questionnaire measured participants' rumination and their negative reaction to rumination. Correlations and multiple regressions were used to determine if there was a relationship between stress levels and rumination levels.

A multiple linear regression model revealed that there was no relationship between overall total POMS change scores as the dependent variable and rumination ($B = .178$), negative reaction to rumination ($B = -.126$), and condition ($B = .019$) as the predictors, $t(111) = .916$. In essence, our multiple regression model shows that all conditions produced equal rumination levels, $p = .436$, $R^2 = .024$. Correlations further revealed that neither RTQ ($r = .109$) or RTQ2 ($r = -.036$) are significantly related to POMS change scores (p values > .247). This indicates that there is no significant relationship between rumination and stress levels.

Under the categorization proposed by Feldman and colleagues (2010), that high ruminators score 9 or higher on and low ruminators score below 9 on the RTQ, the *M* RTQ of the present study shows that the participants, on average, are high ruminators as the *M* rumination score is 11.259. As previously discussed, we also know that participants in all conditions were able to equally decrease their overall stress scores. Conversely, a correlation between total POMS change scores and the RTQ ($r = .109$) revealed that high rumination levels were not significantly related to a decrease in stress scores, ($p = .247$). This is contrary to our predication that rumination may act as a form of mental preparation in order to decrease stress. However, two of the POMS subscale change scores revealed significant negative correlations with negative reaction to rumination. In essence, the more negative reactions participants experienced due to

their rumination, they were less tense (r = -.199, p = .032) and confused (r = -.358, p = .000). These preliminary correlations may reveal that negative reaction to rumination could be a coping response to buffer the effects of stress.

Exploratory Analyses

Lastly, an exploratory analysis section is included in order to review the other statistical analyses that were run after data collection. The experimenter examined one-sample t-test trends related to the six subscales of the POMS to see if there were differences in how many stress subscales each condition reduced.

While the analyses indicated that all four of the interventions did reduce overall stress, additional one-sample t-tests analyses were conducted to see if the subscales of the POMS were differently impacted by the interventions. The POMS measure has six subscales: tension, depression, anger, vigor, fatigue, and confusion (see Table 7 for all POMS subscales change scores' means, standard deviations, standard error means, confidence intervals, significance levels, and effect sizes). These analyses demonstrated that the POMS subscales showed unique responses to the interventions within the different conditions. For the MM Ant condition, depression, anger, and fatigue were all significantly reduced (all p values < .019 and Cohen's d effect sizes > .923). The MM No Ant condition reduced depression, anger, and fatigue, and confusion (all p values < .026 and Cohen's d effect sizes > .904). On the other hand, GI Ant was the only condition to significantly reduce all six subscales (all p values < .001 and Cohen's d effect sizes > 1.05). Conversely, the GI No Ant condition only significantly reduced anger, (p = .001, d = 1.384). As GI Ant was able to significantly reduce all six subscales, one may question if these decreases are a function of the guided imagery meditation and the role of anticipation or if this is a function of the GI Ant condition having significantly higher POMS scores at baseline.

Nonetheless, these one-sample t-tests begin to reveal preliminary patterns that show the role of anticipation may impact guided imagery meditation, but do so to a lesser degree for mindfulness conditions.

Table 7: *POMS Subscales' Change Scores*

TENSION	**Condition**	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size (*d*)**
	MM Ant	0.875	8.011	1.416	(-2.013, 3.763)	0.221
	MM No Ant	0.929	5.85	1.106	(-1.34, 3.197)	0.324
	GI Ant	3.857	7.457	1.409	(.966, 6.749)	1.05*
	GI No Ant	1.429	8.617	1.628	(-1.913, 4.77)	0.337
DEPRESSION	**Condition**	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size (*d*)**
	MM Ant	5.344	8.453	1.494	(2.296, 8.392)	1.283**
	MM No Ant	2.714	3.473	0.656	(1.368, 4.061)	1.593**
	GI Ant	5.214	7.505	1.418	(2.304, 8.124)	1.416**
	GI No Ant	3.107	8.539	1.614	(-.204, 6.418)	0.739
ANGER	**Condition**	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size (*d*)**
	MM Ant	3.742	6.033	1.084	(1.529, 5.955)	1.24*
	MM No Ant	2.286	5.141	0.972	(.292, 4.279)	.904*
	GI Ant	5.815	7.109	1.268	(3.003, 8.627)	1.666**
	GI No Ant	3.286	4.837	0.914	(1.41, 5.161)	1.384**
VIGOR	**Condition**	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size (*d*)**
	MM Ant	1.813	5.415	0.957	(-.14, 3.765)	0.229
	MM No Ant	0.607	5.391	1.019	(-1.483, 2.698)	0.229
	GI Ant	2.5	3.226	0.61	(1.249, 3.751)	1.58**
	GI No Ant	0.889	4.799	0.923	(-1.009, 2.787)	0.379
FATIGUE	**Condition**	**Mean Change**	**Std. Deviation**	**Std. Error Mean**	**95% CI (Lower, Upper)**	**Effect Size (*d*)**

	MM Ant	2.1	4.633	0.846	(.37, 3.83)	0.923*
	MM No Ant	2.889	3.906	0.752	(1.344, 4.434)	1.508**
	GI Ant	3.08	3.851	0.77	(1.491, 4.67)	1.631**
	GI No Ant	1.88	4.658	0.932	(-.043, 3.803)	0.824

CONFUSION	Condition	Mean Change	Std. Deviation	Std. Error Mean	95% CI (Lower, Upper)	Effect Size (*d*)
	MM Ant	0.655	2.955	0.549	(-.469, 1.78)	0.451
	MM No Ant	2	2.154	0.4225	(1.13, 2.87)	1.896**
	GI Ant	3.609	3.056	0.637	(2.288, 4.93)	2.414**
	GI No Ant	1.08	3.148	0.63	(-.219, 2.379)	0.699

* = $p < .05$, ** = $p < .01$

Analyses Not Presented

It is important to note that multiple linear regressions were first examined to look at differences between conditions instead of using 2x2 ANOVAs. These regressions are documented below to show that this approach was attempted.

There were four regression models for each repeated variable that examined stress scores, anxiety scores, heart rate, and blood pressure. At first, the experimenter believed that including pre scores as a predictor in each regression model and post scores as a dependent variable in each regression model would control for baseline differences. Mixed results were found when examining 2x2 ANOVAs that analyzed change scores and the multiple regressions that analyzed pre and post scores. The experimenter determined that the regression models were not truly accounting for baseline differences, as it is believed that the shared variance between pre and post scores was responsible for the regression results. The experimenter then determined that using change scores with ANOVAs was a direct assessment of how much one's stress, anxiety, heart rate, and blood pressure scores were impacted. Due to the limitations found with using regression, the researchers chose to use the ANOVA change scores' results when examining

between group differences. The use of ANOVAs also follows previous literature on mindfulness meditation that examined between group differences (for examples see Johnson et al., 2013; Zeidan et al., 2010a; Zeidan et al., 2010b). Therefore, we conclude that there are no differences between conditions for these variables.

Lastly, the general trait of mindfulness was evaluated at the beginning of the study by using the self-reported FMI. Data on one's general mindfulness was collected in order to examine whether trait mindfulness would impact participants' ability to engage in meditation. As there were no differences found between meditation groups, FMI data was not analyzed.

Discussion

In summary, the current study investigated three main questions related to mindfulness meditation: the benefits of a brief one-session preventative mindfulness meditation, the effects of mindfulness meditation as compared to guided imagery meditation, and the relationship between stress and rumination when facing either an anticipated or unanticipated stressor. The study interventions significantly reduced self-reported stress scores across all conditions, but there were no differences between types of meditation or evidence of strong differences as a function of stress anticipation. Moreover, self-reported anxiety, heart rate, and blood pressure measures were not impacted by any of the meditation interventions. Contrary to our predictions, mindfulness meditation was not more effective than guided imagery meditation in preventing self-reported and physical symptoms of stress and anxiety. Additionally, participants in all conditions had mean rumination scores that defined them as high ruminators (based on rumination score averages in Feldman et al., 2010). The relationship between high rumination and a reduction in stress was not significant.

Overall, in contrast to prior studies (e.g., Mohan et al., 2011), the current study demonstrates an instance when physiological measures are not necessarily better than the behavioral measures at revealing reductions in stress and anxiety. Blood pressure and heart rate were not significantly reduced, but self-reported stress scores were significantly reduced. This may lend support to show the type of effect meditation may have on an individual. For instance, completing a meditation practice may yield a participant to psychologically believe s/he is less stressed, even though their physical stress levels have remained the same.

The first goal of the current study was to test for any beneficial effects of one-session of a preventative mindfulness meditation. The literature discusses that there is a of lack preventative intervention studies on the effects of mindfulness in a nonclinical sample (Tanay et al., 2012). The mindfulness meditation in this study was adapted from a study conducted by Johnson and colleagues in 2013. To the experimenter's knowledge, Johnson and colleagues conducted one of the first studies to date to solely examine a comprehensive one-session mindfulness meditation, but their study did not include a stressor. Therefore, the present study is one of the first to examine the preventative effects of one-session of mindfulness meditation in a non-clinical population that included a stress manipulation. Both the Johnson et al. (2013) and the current study were successful in reducing total POMS stress scores and the POMS subscale confusion scores, although neither study reduced anxiety. Additionally, Zeidan and colleagues (2010a) examined POMS changes from sessions to session across four days of mindfulness meditation. Neither Zeidan and colleagues nor the current author were successful in finding major differences between mindfulness meditation conditions and control conditions/active treatment conditions.

Moreover, Zeidan and colleagues' (2010b) results differed from those of the current study and found that three days of practicing mindfulness meditation was more effective at reducing total POMS stress scores, depression, fatigue, confusion, and heart rate when compared to control conditions. While the current study was able to find significant reductions in total POMS stress scores, depression, and fatigue for the mindfulness conditions, these reductions were not significantly different from the guided imagery meditation conditions. Furthermore, Zeidan and colleagues (2010a) were able to significantly reduce all six POMS subscales in the mindfulness conditions. Even though these reductions were not significantly different from the control conditions, this differs from the current study in which the mindfulness conditions were only able to reduce three to four subscales. Both Zeidan and colleagues (2010a) and Zeidan and colleagues (2010b) show that mindfulness meditation may need to be extended over three to four days in order to significantly reduce all six subscales or find differences between conditions. Additionally, Zeidan and colleagues (2010b) are among one of the first researchers that show brief mindfulness having a significant physiological effect on heart rate. Zeidan et al. (2010b) used an in person facilitator to conduct the mindfulness meditation sessions, which differs from the audio recordings used in Johnson et al. and the current study. This potentially demonstrates that the delivery method (in person, in a group setting, listening to recording, etc.) may be an indicator of how effective the mindfulness meditation will be for reducing stress as marked by physiological measures. Zeidan et al. (2010b) also shows that three days of practicing mindfulness for 20-min a day with an instructor may be the optimal frequency and length in order for mindfulness to be superior than a control condition on both behavioral and physiological measures.

Overall, prior brief and one-session formats of mindfulness meditation (Johnson et al., 2013; Zeidan et al., 2010a; Zeidan et al., 2010b) did not include a stressor. The current study included a stressor after participants meditated, which makes the one-session mindfulness meditation a preventative intervention. While mindfulness was not found to be more effective than guided imagery meditation, one-session of mindfulness meditation was still effective in inhibiting a build up of self-reported stress. Exploratory analyses revealed that the MM Ant condition significantly reduced total stress scores, depression, anger, and fatigue and the MM No Ant condition correspondingly reduced total stress scores, depression, anger, fatigue and confusion. Confusion was the only POMS subscale that was significantly reduced in both the present study and in prior brief and one-session mindfulness meditation studies (Johnson et al., 2013; Zeidan et al., 2010a; Zeidan et al., 2010b). As a one-session preventative intervention, the current study lends support that 20-minutes of mindfulness meditation can be incorporated into a therapy or counseling session as a strategy to prevent stress levels from increasing (Brown et al., 2013). Given that empirical research surrounding mindfulness in counseling often includes short-term formats that examine the effects of mindfulness-based cognitive therapy, studying one preventative session of mindfulness meditation begins to question if there is a threshold of mindfulness that is required in order for clients to enjoy its benefits (Brown et al., 2013).

The second goal of the current study compared mindfulness meditation to guided imagery meditation. It was hypothesized that mindfulness meditation would be more effective at reducing self-reported and physiological symptoms of stress and anxiety. However, this alternative hypothesis is not supported as no differences were found between the mindfulness and guided imagery interventions. Both interventions were able to significantly reduce self-reported stress scores. Neither intervention significantly impacted heart rate. However, consist with the results

from Mohan and colleagues (2011), heart rate levels from pre to post intervention begin to reveal a trend. Overall, Mohan and colleagues (2011) found one-session preventative formats more effective than recovery formats of guided imagery meditation. This was inferred due to the greater decreases in cortisol responses found in preventative formats. However, in both one-session prevention and recovery formats, heart rate increased. In the current study, both guided imagery conditions increased heat rate whereas the mindfulness mediation conditions decreased heart rate. While these increases and decreases were not significant, they may be related to Mohan et al.'s (2011) findings that one-session of guided imagery may not have a beneficial impact on heart rate. However, Bigham, McDannel, Luciano, and Salgado-Lopez (2014) argue that a one-session guided imagery exercise may be most effective at reducing heart rate when perceived stress levels are low.

Additionally, the current study found that mindful meditators did not have superior performance over guided imagery meditators when facing an unanticipated stressor. This differs from a prior study conducted by Valentine and Sweet (1990) that found mindful meditators demonstrated superior performance when compared to concentrative meditators when facing an unanticipated stimulus. Overall, the present study is one of the first to directly compare one-session of mindfulness to one-session of guided imagery. In seeing that there were no differences between conditions, it is inferred that guided imagery was not an active control condition, but rather an active treatment condition. In essence, one-session of mindfulness meditation is not more effective than one-session of guided imagery meditation.

Furthermore, when taking a closer look at the POMS subscales, one can make further comparisons between mindfulness meditation and guided imagery meditation. Mindfulness appears to be more robust to the effects of anticipation as both MM Ant and MM No Ant

reduced negative mood on three to four of the POMS subscales, which include depression, anger, fatigue, and confusion. On the other hand, guided imagery revealed that if a stressor can be anticipated, then this intervention has the power to reduce scores on all six POMS subscales. However, if a stressor cannot be anticipated, this intervention only has the power to reduce the anger subscale. In essence, mindfulness may be unique in its ability to be equally robust against anticipated and unanticipated stressors.

The third goal of the current study was to examine the relationship between stress and rumination when facing an anticipated or unanticipated stressor. Literature reviews revealed mixed findings that concern meditation's impact on rumination. For instance, Morsella and colleagues (2010) found that when participants could anticipate a future task, they had more intrusive cognitions during a concentrative meditation. However, these intrusive cognitions were defined as mental preparation for the upcoming task. These thoughts of being mentally prepared may actually decrease stress. Therefore, if intrusive thoughts have the power to promote mental preparation then rumination may be correlated to a decrease in stress. On other hand, Jain and colleagues (2007) inferred that mindfulness meditation may be unique in its ability to reduce rumination. The results of the current study did not show differences in the rate of intrusive cognitions when facing either an anticipated or unanticipated stressor. In essence, anticipating a future task did not lead to more intrusive cognitions than when facing an unanticipated task as found in Morsella and colleagues. Moreover, the mean rumination scores in each condition show that participants in the current study are classified as high ruminators according to Feldman et al. (2010). This does not support Jain and colleagues (2007) inference that mindfulness meditation may be unique in its ability to decrease rumination. Specifically, this conclusion follows from the MM Ant condition having the highest rumination (M = 12.313) and negative reaction to

rumination (M = 6.125) scores. As mindfulness was not able to keep participants from highly ruminating, mindfulness' ability to reduce rumination may be contextual depending if the mindfulness occurred before or after the stress.

Overall, there was no significant relationship between rumination and stress levels in any condition. In all conditions participants had a mean rumination score that classified them as high ruminators and all meditation conditions were able to decrease stress scores. Because there were no differences between conditions, stress anticipation did not play a role in increasing intrusive cognitions. However, when taking a closer look at the POMS subscale change scores, two correlations emerge. Negative reaction to rumination is negatively correlated with the tension and confusion subscales. This demonstrates that the more a participant was negatively reacting to their rumination, the less tense and confused they felt. Therefore, negative reaction to rumination may be a coping mechanism to better handle stress.

Limitations

The current study has a number of limitations. The first is that the procedure measured stress and anxiety at two points instead of three or more points. Because we did not give measures after participants completed the meditation, but before they completed the speech preparation task, we cannot know if there was an anticipatory coping response. In essence, we cannot truly know if participants' stress levels before completing the speech preparation task were different than after they completed the speech preparation task at the end of the study. For instance, if the POMS was given after meditating, but before the completion of the speech preparation task, results might have shown an increase in stress/anxiety followed by a significant decrease. Attempting to reveal this anticipatory coping response pattern may have been able to expose between group differences. As different POMS subscales were affected in each condition,

adding more participants to increase power may have been another possibility to expose between group differences. Due to no differences between conditions, the guided imagery conditions may have served as active treatments. Including a pure control condition may also have been important to understand the mechanisms associated with each type of meditation.

Additionally, findings in this study should be interpreted with caution, as they may be statistical artifacts due to running a large number of analyses. As shown in the analyses not presented section, a number of regressions were initially used to explore the data. Moreover, the large number of t-tests used in this study may have inflated the significance level for some of the variables. Gender differences were also not accounted for in the analysis. As more females (n = 80) were participants in the study than males (n = 24), there was not sufficient power to examine gender.

Also, this study used ANOVAs as a way to examine differences between conditions. It is important to note that it is a limitation that covariates were not included in the ANOVA models. Covariates could have included demographic variables of how much previous exposure the participants had to meditation, if the participants thought they were truly meditating, and if the participants were comfortable with public speaking.

Future Directions

The current study is able to provide new avenues for future research. For instance, in this study design meditation was used as a preventative intervention. A future study could examine the same meditations, measures, and speech task, but in a recovery intervention. It would be interesting to compare results from the prevention intervention to the recovery intervention to determine if one session of mindfulness is more effective as a preventative or recovery intervention. Similar to the methodology of Johnson and colleagues (2013) and Zeidan and

colleagues (2010b), future research could include sham meditations in order to begin to determine the underlying mechanisms that contribute to mindfulness and guided imagery reducing stress levels. Sham meditations do not include all of the active ingredients of true meditations (Johnson et al., 2013). Thus, if a true meditation is more impactful than a sham meditation we could begin to target which mechanisms are contributing the meditation's effectiveness. The study design could also be extended to be a longitudinal design to measure participants at different points in the future. A longitudinal design would allow one to see if exposure to one-session of meditation encourages participants to practice meditation on their own. Additionally, it would be interesting to see how long the effects of meditation would persist after the study is complete. Could one-session meditation effects last minutes, hours, days or even weeks? Are these effects dependent upon the delivery of the meditation? For instance, do the effects remain constant when the meditation is facilitated by an instructor versus an audio recording?

Also, as this study did not show differences between groups, future research should continue to compare mindfulness meditation to guided imagery meditation. How similar are the two meditations? Mohan and colleagues (2011) found that one-session of guided imagery meditation did not influence heart rate, yet found a reduction in serum cortisol. Another area of study could be to examine cortisol levels as an indication for physiological stress responses.

Conclusion

In conclusion, the current study showed that one-session mindfulness meditation is beneficial in reducing self-reported stress scores, but that one-session did not impact anxiety, rumination, heart rate, and blood pressure variables. Additionally, one-session of mindfulness meditation and one-session of guided imagery meditation were comparable in reducing self-

reported stress. However, stress subscales begin to show that mindfulness may be unique in its robustness whether or not participants are able to anticipate an upcoming stressor. Moreover, although participants in all conditions had high rumination scores, they were able to reduce their stress scores from pre to post intervention. Nonetheless, there was not a significant relationship between rumination and stress scores.

Overall, the results support that one-session of mindfulness may be beneficial in reducing self-reported stress. Future research should further examine to see whether one-session of mindfulness meditation can be more effective than guided imagery meditation within a different design, such as a recovery intervention. Additionally, just a single session of either mindfulness or guided imagery meditation may have the potential to reduce stress in a counseling setting. In essence, this study supports the potential benefits of multiple therapeutic approaches when completing one-session of meditation. This may possibly increase the range of individuals who can receive positive benefits from a one-session meditation practice.

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