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## An Examination of the Effects of Guided Imagery Theme on Stress and Mood Following an Ego-Depletion Task

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AN EXAMINATION OF THE EFFECTS OF GUIDED IMAGERY THEME ON STRESS AND MOOD  
FOLLOWING AN EGO-DEPLETION TASK

by

THOMAS H. HUTCHISON

(Under the direction of Jessica Brooks, Ph.D.)

ABSTRACT

People experience stress on a daily basis. If not properly managed, stress can lead to disturbances in cognitive functioning, mood-related problems, obesity, and heart disease. Guided imagery has been shown to be an effective technique to help people recover from stress. The literature on guided imagery, however, does not take the theme of the guided imagery script into account. Additionally, there are gaps in the research regarding any interaction between rurality and mood, stress, and guided imagery. A repeated measures MANOVA was conducted to test the main aim of this study; that is, to determine if theme of guided imagery influences self-reports of stress and mood following an ego-depletion task. Results revealed no effect of condition (guided imagery) on self-reported stress and mood, but revealed an effect of time (i.e., 10 minutes) on self-reported stress and mood. These results suggest that 10 minutes of rest may have the same stress-reducing effect as guided imagery.

INDEX WORDS: Stress, Mood, Guided imagery, Relaxation, Ego depletion

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by

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## DEDICATION

This work is dedicated to my lovely wife, Catherine. Your love, support, and encouragement help me soar to new heights, and I know I can reach any goal with you by my side. I love you, *mo chuisle!*

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## CHAPTER 1

### INTRODUCTION

Stress is a natural part of life. Stressors can range from daily hassles, such as getting stuck in traffic, to major events, such as marriage or the death of a loved one. Researchers have found stress can negatively influence an individual's metacognitive functioning such that they may answer a question incorrectly and may have less self-confidence regarding that answer (Reyes, Silva, Jaramillo, Rehbein, & Sackur, 2015). Additionally, Dallman (2010) found a link between stress and obesity; individuals who are already overweight may increase their food intake when experiencing stress. Finally, Duman and Monteggia (2006) suggest stress may lead to neuronal atrophy in parts of the brain implicated in depression. Thus, according to the authors, stress may exacerbate depressive symptoms. The present research focuses on the effects of stressors on an individual's physical and psychological health in an experimental setting (Dallman, 2010; McEwan, 2007; Reyes et al., 2015).

Given the variety of negative outcomes associated with stress, researchers have sought methods of reducing stress as one approach to improving quality of life. One such method is guided imagery, which has a long history of use across many different cultures (Utay & Miller, 2006). Guided imagery has been shown to have benefits in many areas, including learning and rehearsing new skills, learning more effective problem-solving techniques, increasing creativity, improving motivation and performance in sporting activities (Utay & Miller, 2006), reducing perceived and chronic pain (Burhenn, Olausson, Villegas, & Kravits, 2014; Dobson, 2015), and reducing stress (Carter, 2006; Melville, Chang, Colagiuri, Marshall, & Cheema, 2012; Weigensberg et al., 2009). Little, if any, research has focused on exploring the significance of theme in guided imagery. In the present research, we are motivated by the question: How important is the theme of a guided imagery exercise? This question came about by exploring another popular avenue for stress reduction – nature.

The terms nature, greenery, and greenspace are used to describe natural, usually wooded, environments. Anecdotally, outdoor spaces with a certain amount of flora are known to be relaxing and rejuvenating for many people. Scientifically, researchers have two main theories for this effect: Stress

Recovery Theory (Ulrich, 1983) and Attention Restoration Theory (Kaplan, 1995). In both theories, natural environments are considered to be “restorative environments” and help to quicken the process of recovering from stress (Berto, 2014). As described by Berto (2014), the main difference between the two theories is that Stress Recovery Theory applies more to physiological stress whereas Attention Restoration Theory applies more to “mental fatigue”. Additionally, evidence suggests that even virtual exposure to greenery can help individuals recover from stress (Jiang, Chang, & Sullivan, 2014).

### **Statement of Problem**

Previous research provides evidence of a strong relationship between natural settings and stress reduction (Jiang, Chang & Sullivan, 2014; Kaplan, 1995; Lee, Park, Tsunetsugu, Ohira, Kagawa & Miyazaki, 2011; Toda, Den, Hasegawa-Ohira, & Morimoto, 2013; Ulrich, Simons, Losito, Fiorito, Miles & Zelson, 1991), as well as a strong relationship between guided imagery and stress reduction (Bigham, McDannel, Luciano & Salgado-Lopez, 2014; Burns, Lee & Brown, 2011; Melville et al., 2012; Utay & Miller, 2006; Weigensberg, Lane, Winners, Wright, Nguyen-Rodriguez, Goran & Spruijt-Metz, 2009). People who work indoors and those who live in urban areas where natural settings may not be readily available may find it difficult or unfeasible to de-stress in a natural setting (e.g., during a break from work). Therefore, an activity that can simulate a natural environment may prove to be beneficial. Notably, since a strong relationship has been found between guided imagery and stress reduction, it is possible that guided imagery involving natural settings may be a significant, in-the-moment exercise people can utilize as a means by which to reduce stress.

### **Purpose**

The primary purpose of the current study is to examine the effect of guided imagery on both perceived and physiological stress, as well as determine whether the theme of the guided imagery exercise has a significant impact on stress. Specifically, the current study aims to explore the differences, if any, between a forest-themed guided imagery exercise and an urban-themed guided imagery exercise. Our goal is to determine if the theme of the imagery exercise plays a role in reducing stress.

## **Significance**

Given the negative effects of stress, it should be no surprise that researchers are attempting to find more effective methods of stress management. Guided imagery as an intervention offers an easy method of stress management that can be applied realistically in the moment from many locations. Consider the following examples: someone who works in an office setting may not be able to go outside at any given moment, or a person able to take a break outdoors may stay inside during certain weather conditions. In either situation, an individual would likely be able to spend 10 minutes engaged in a guided imagery exercise at his/her work station.

## **Definition of Terms**

**Anxiety.** According to the American Psychiatric Association (2013), anxiety is “the apprehensive anticipation of future danger or misfortune accompanied by a feeling of worry, distress, and/or somatic symptoms of tension” (p. 818). Anxiety can include feelings of distress, but stress can be present without anxiety.

**Attention Restoration Theory (ART).** Kaplan (1995) suggested natural environments help individuals recover from mental fatigue. Kaplan described mental fatigue as the result of attending to something which was not inherently interesting to the individual, and went on to write that turning one’s attention to a natural setting – which is considered, by Kaplan, to be more interesting to the individual – would be enough to help the individual recover from mental fatigue.

**Ego Depletion.** According to Baumeister, Bratslavsky, Muraven, and Tice (1998), self-regulation draws on some limited resource such as strength or energy, and depleting this resource can lead to decreased impulse control and decreased motivation to perform tasks. Dwall, Baumeister, Stillman, and Gailliot (2007) further suggest that this depleted self-control can lead to aggressive behaviors. According to the authors, aggressive behaviors are held in check by self-control, which they described as a finite resource. Once a person’s self-control is depleted, he/she would be more likely to act out more aggressively than normal.

**Guided Imagery.** Guided imagery is an exercise in which a script is used to help an individual

generate and focus on a specific mental image, or visualization. This visualization can be used to promote health through relaxation and stress reduction, and can also be used for skills development (Varvogli & Darviri, 2011). Although considered a form of meditation, it should be noted that there are differences between guided imagery and mindfulness-based meditation practices (see mindfulness meditation below).

**Mindfulness Meditation.** The purpose of mindfulness is to become more aware of one's own experience in the present moment (Kabat-Zinn, 1990). Therefore, mindfulness meditation asks the individual to focus on his/her own internal experiences (i.e., thoughts, emotions, perceptions, physical sensations) and not focus on imagined scenarios. A common practice in mindfulness meditation involves focusing on the act of breathing and turning one's attention away from any other thoughts (Kabat-Zinn, 1990). Additionally, mindfulness can be applied to other activities such as walking or performing other tasks.

**Stress.** When external stimuli lead to activation of the hypothalamic-pituitary-adrenal gland (HPA) axis, it initiates a state of physical and emotional arousal (Kogler et al., 2015). This state of arousal is stress. Stress can be physiological or psychosocial. Kogler et al. (2015) described *physiological stress* as an unpleasant sensory, emotional, and subjective experience associated with a potential threat of bodily harm. Conversely, the authors described *psychosocial stress* as a response to a perceived social threat, such as social evaluation or social exclusion (p. 237). According to the authors, both forms of stress can activate the HPA axis to release cortisol, a stress hormone, and lead to a physiological response. Although positive life events such as marriage or the birth of a child can also be considered a form of stress, the current research focuses on stress related to more negative situations.

**Stress Recovery Theory (SRT).** Ulrich (1983) suggested that natural environments help individuals recover from physiological stress. Later research by Ulrich et al. (1991) utilized exposure through videotaped scenes involving natural and urban settings, and suggested that exposure to videotaped natural settings can improve physiological and perceived stress.

## CHAPTER 2

### LITERATURE REVIEW

For clinicians working with individuals for stress and related problems, it is necessary to understand the experience of stress. Stress can be conceptualized as a biopsychosocial reaction to a perceived threat (Kogler et al., 2015). A perceived physical threat activates the fight-or-flight system within the brain and prepares a person to either face the threat or escape (Fish, 2018; Kogler et al., 2015). Similarly, a perceived psychosocial threat, such as social exclusion, can activate a stress response that includes increased cortisol production (Kogler et al., 2015). Previous research suggests stress-response activation is a method of returning the brain to homeostasis by helping the individual to overcome the stressor; however, frequent activation of the stress response system can lead to chronic health problems due to the interconnected nature of the central and peripheral nervous systems (Chrousos, 2009).

Prolonged stress activation can have negative effects on one's physical and emotional health, and it has been linked to obesity, heart disease, cognitive impairment, and exacerbation of certain mood disorders (Brotman, Golden, & Wittstein, 2007; Dallman, 2010; Duman & Monteggia, 2006; Galla, O'Reilly, Kitil, Smalley, & Black, 2015; McEwen, 2007; Reyes et al., 2015). Some symptoms of stress include, but are not limited to, memory problems, difficulty concentrating, sleep disturbances, aches and pains, digestive problems, and mood swings (Brotman et al., 2007; Galla et al., 2015). Each of the factors associated with stress can impact an individual's personal and professional functioning (McEwen, 2007). Stress is such a prevalent part of life, and researchers have studied many different methods for managing and reducing stress. Many techniques have been promoted as means of reducing stress, including physical exercise, mental exercise, psychotherapy, and various leisure activities.

#### **Stress and Exercise**

Physical exercises have been shown to lower both perceived stress and anxiety (Broman-Fulks et al., 2015; Salman, 2001; Streeter et al., 2010). Common physical exercises promoted for stress reduction include aerobic workouts and other low-impact exercises such as yoga or walking (Broman-Fulks, Kelso, & Zawilinski, 2015; Caldwell et al., 2009; Kalak et al., 2012; Streeter et al., 2010).



In recent years, practices such as yoga have become a popular method for relieving stress. As such, yoga has gained considerable attention from researchers (e.g., Melville et al., 2012; Rizzolo, Zipp, Stiskal, & Simpkins, 2009; Streeter et al., 2010). Research involving yoga practices have included populations ranging from graduate students in healthcare-related fields to professionals working in office settings (Melville et al., 2012; Rizzolo et al., 2009). Rizzolo et al. (2009) found that performing 30 minutes of yoga for one day per week over a period of three weeks significantly reduced physiological and psychological stress in participants. Further, Melville et al. (2012) found practicing one 15-minute session of chair-based yoga techniques during a lunch break immediately reduced psychological and physiological stress. Both studies provide support for yoga as a quick relaxation technique that many people can use almost anywhere. Although yoga certainly shows promise as an easy-to-use, stress-reduction activity, some individuals may not be able or willing to practice it. Thus, individuals may benefit from alternative techniques for stress reduction.

Another easy form of physical exercise most people can do is walking. Research shows walking can positively impact physical and psychological health (Oppezzo & Schwartz, 2014; Weng & Chiang, 2014). Walking approximately two-to-three kilometers through a natural setting has been shown to reduce anxiety and restore attention in a population of Taiwanese university students (Weng & Chiang, 2014). Additionally, Toda, Den, Hasegawa-Ohira, and Morimoto (2013) studied the effects of woodland walking on physiological stress and perceived psychological stress. Participants walked along a mountain path in Japan for 1000 meters. The authors reported that participants exhibited higher physiological stress responses – as measured by salivary cortisol levels – after the walk, but they also subjectively reported feeling uplifted. Thus, the walk may have been perceived as physically difficult, but mentally/emotionally refreshing. Such emotional refreshment, according to Oppezzo and Schwartz (2014), may also have a positive impact on creative thinking. In one study, walking – especially outdoors – aided in participants' ability to think creatively (Oppezzo & Schwartz, 2014).

Physical exercises, such as yoga or walking, can have a profound impact on physical and mental wellness. Such exercises may increase physiological stress but decrease perceived psychological stress,

and potentially improve cognitive functioning. Even a brief round of chair-based yoga, or a short walk, can produce a restorative effect and help improve a person's mood.

### **Stress and Nature**

Although exercising provides many physical and mental health benefits to people, the very act of being outside in a natural environment may also benefit people. According to Attention Restoration Theory (ART), natural environments can help many people recover from mental fatigue, which may be thought of as a form of psychological stress (Kaplan, 1995). As described by Marcora, Staiano, and Manning (2009), *mental fatigue* is a psychobiological state induced by “prolonged periods of demanding cognitive activity” (p. 857) and can influence a person's cognitive and physical performance when completing tasks.

Similar to ART, Stress Recovery Theory (SRT) suggests natural environments can help people recover from physiological stress (Ulrich et al., 1991). Unlike with ART, Ulrich and colleagues suggest that redirecting one's attention is not the mechanism of recovery. Rather, the authors suggest natural environments cause a shift to a more positive mood state which leads a person to focus his/her attention on the natural environment.

More recent research suggests both of these theories may be correct. For example, Lee et al. (2011) compared the effects of sitting in a wooded area and observing nature for 15 minutes to those of sitting in an urban environment for 15 minutes. The authors found that 15 minutes of just sitting in a wooded area significantly reduced physiological and psychological stress compared to sitting in an urban area. Additionally, McCaffrey and Liehr (2016) studied the effects of strolling through a garden setting and found that a 6-week program of reflective garden walking, defined as “a form of meditation in which the participant walks slowly or sits still in a garden area while staying mentally alert,” may significantly reduce stress (p.179). According to several studies, natural environments appear to help alleviate stress through various means, including promoting social cohesion, physical exercise, and attention restoration (Lee et al., 2011; McCaffrey & Liehr, 2016; Toda et al., 2013). In this regard, people in rural areas may benefit from easier access to natural areas. In regard to guided imagery, people from rural areas who may

be more familiar with natural settings would be able to more easily recall such settings for use in a guided imagery exercise.

All of the methods discussed above may help people relax, but people living in urban environments may not have easy access to natural, wooded environments. However, at least one study suggests individuals can experience a reduction in stress through a virtual landscape. Specifically, Jiang, Chang, and Sullivan (2014) found that watching a 6-minute video of a streetscape with a tree density between 24% and 34% led to quicker recovery from stress in men. No significant results were found in women in this study, and the authors suggested biological and social differences between men and women may be related to cortisol responses. Specifically, the authors cited previous research indicating that women have a milder cortisol response compared with men, which may be due to higher levels of oxytocin and lower levels of vasopressin in women (Aguilera, 1998; Neumann, 2007). Additionally, some research provides evidence that men experience a stronger cortisol response to performance-oriented stressors while women experience a stronger cortisol response to interpersonal stressors (Dedovic et al., 2009; Lottrup et al., 2013, as cited by Jiang, Chang, & Sullivan, 2014). Of note, no other studies reviewed for the current study indicated a significant relationship between biological sex and stress response.

### **Stress and Meditation**

Some individuals who do not have access to wooded areas may achieve stress reduction through alternative means such as meditation and guided imagery. Meditation and guided imagery have been practiced by various groups of people for thousands of years. Exercises of some sort have been practiced within Hinduism, Buddhism, ancient Chinese religions, Native American culture, and Judeo-Christian cultures (Utay & Miller, 2006; Varvogli & Darviri, 2011). A variety of techniques are considered to be evidence-based and are currently used in psychotherapy. Such techniques include Progressive Muscle Relaxation, relaxation response, Transcendental Meditation, Mindfulness-based Stress Reduction, diaphragmatic breathing, and guided imagery (Grossman, Niemann, Schmidt, & Walach, 2004; Kabat-Zinn, 1990; Pawlow & Jones, 2002; Varvogli & Darviri, 2011; Weigensberg et al., 2009).

Progressive Muscle Relaxation (PMR) is a technique in which individuals alternate between tensing and relaxing muscle groups in a certain order. Developed in the 1920s, PMR is a popular technique to help individuals learn to relax in stressful situations. In practice, an individual intentionally tenses a specific muscle group, holds it several seconds, and then relaxes that muscle group completely. This process has been known to help individuals with anxiety learn to relax their already tense muscles when feeling anxious (Jacobson, 1925; Pawlow & Jones, 2002). Research shows that PMR can also “bring quiet to the nervous system” (Jacobson, 1925, p. 73) and lead to relaxation (Pawlow & Jones, 2002).

Relaxation response training is another program shown to have a beneficial effect regarding stress management. Developed in the 1960s, relaxation response operates under the premise that the physiological stress response can have an opposite physiological response. In short, a person can relax by learning to consciously activate the relaxation response whenever the stress response is activated (Benson & Klipper, 2000; Varvogli & Darviri, 2011). The person first spends 10-20 minutes each day repeating a word, sound, prayer, thought, phrase, or muscle movement, and concentrating on the activity. The individual then returns to this repetition whenever the stress response activates (Benson & Klipper, 2000; Varvogli & Darviri, 2011). In this manner, the person can distract from stressful thoughts and activate the relaxation response. By practicing when they are not stressed, people can more easily activate the relaxation response in a stressful situation.

In Transcendental Meditation, individuals meditate by closing their eyes and repeating a mantra to themselves twice a day for 20 minutes each time. This practice is thought to cause a natural shift in an individual’s awareness to “a wakeful but deeply restful state,” known as transcendental consciousness (Varvogli & Darviri, 2011; p. 78). This experience is thought to improve blood flow to the brain, thus improving cognition and attention. It has also been reported to decrease perceived stress, perfectionistic thoughts, and depression (Burns, Lee, & Brown, 2011). Although relaxation response training can help people calm themselves in stressful situations, Transcendental Meditation is believed to lead to greater

resilience in stressful situations (Varvogli & Darviri, 2011). Thus, Transcendental Meditation may be more preventative than relaxation response training.

Mindfulness-Based Stress Reduction (MBSR) has been shown to be an effective method of helping individuals learn to relax themselves and stay focused on the present moment (Grossman, Niemann, Schmidt, & Walach, 2004). MBSR is a structured, brief program that employs meditation and other mindfulness techniques to help alleviate mental and physical pain experienced by individuals (Kabat-Zinn, 1990). According to Kabat-Zinn, mindfulness may help to improve functioning in areas of the brain associated with attention, awareness, and emotion. A total of 23 studies involving MBSR were reviewed by Janssen, Heerkens, Kuijer, van der Heijden, and Engels (2018). The aim of the review was to gain more insight into the effects of two mindfulness interventions on employee mental health: MBSR and mindfulness-based cognitive therapy (MBCT). The authors concluded MBSR may lead to decreased levels of emotional exhaustion, stress, depression, and anxiety. In this regard, MBSR may have an effect similar to that of a natural setting as conceptualized from Attention Restoration Theory. In other words, mindfulness-based exercises may help someone recover from mental fatigue or perceived stress.

Many relaxation techniques, such as yoga and meditation, involve diaphragmatic breathing. Also known as deep breathing, this technique involves drawing air fully into one's lungs. In this technique, the goal is to breathe deep enough to allow for the full expansion of the abdomen, as opposed to just the chest. Deep breathing has been shown to improve heart rate, increase the flow of blood and oxygen, and help individuals feel alert, invigorated, and relaxed (Martarelli, Cocchioni, Scuri, & Pompei, 2011; Varvogli & Darviri, 2011).

Researchers have also studied guided imagery for years and results have been promising in the relief of stress (e.g., Utay & Miller, 2006; Weigensberg et al., 2009). Weigensberg et al. (2009) tested a four-week interactive guided imagery protocol on a sample of Latino adolescents. Researchers obtained salivary cortisol levels from each participant before and after each session, and found a significant reduction in salivary cortisol levels by the end of the four-week treatment. The authors concluded that 45 minutes of guided imagery every week for four weeks significantly reduced salivary cortisol levels among

participants, indicating that participants experienced reduced physiological stress after guided imagery. Additionally, Bigham, McDannel, Luciano, and Salgado-Lopez (2014) studied a brief guided imagery exercise with a sample of university students and concluded that brief guided imagery (i.e., one session) significantly reduced participants' perceived stress and suggested that a longer-term guided imagery protocol may help individuals learn to relax themselves more easily over time.

Guided imagery uses a range of techniques from short, simple visualizations (Bigham et al., 2014) to longer, more extensive visualizations (Weigensberg et al., 2009). Clinicians have used guided imagery as an intervention for grief, anxiety, depression, skill-building, relaxation, and improving motivation and performance in sports (Bigham et al., 2014; Utay & Miller, 2006; Weigensberg et al., 2009). Utay and Miller (2006) suggest guided imagery can be used to learn and rehearse new skills, problem solve more effectively, and improve creativity and imagination. In this manner, guided imagery can be used in mental healthcare settings to help clients learn and improve skills such as relaxation, or it can be used in athletic settings to help athletes improve specific skills, increase motivation, and improve performance.

Guided imagery has also been shown to be comparable to other, more active, mindfulness practices. For instance, Melville et al. (2012) assessed potential differences in self-reports of stress and physiological measures of stress between two groups: one group who engaged in 15 minutes of guided imagery verses another group who participated in 15 minutes of yoga. There were no significant differences between groups with the exception heart rate, which increased during the 15 minutes of yoga and decreased during the 15 minutes of guided imagery (Melville et al., 2012). This provides evidence suggesting guided imagery may be just as effective as yoga as a method of relieving stress.

In short, many types of relaxation techniques have been shown to be beneficial in alleviating both physiological and psychological stress. Of these techniques, guided imagery has been used as an intervention for a variety of psychological concerns and for improving motivation, performance, creativity and imagination, and for building new skills such as problem-solving skills. Conceptually,

long-term use of relaxation techniques such – as PMR, guided imagery, and others – may involve classical conditioning leading to increased self-efficacy in reaching a relaxed state.

### **Current Study**

In the current study, we sought to add to the literature suggesting a brief guided imagery exercise can be used to calm the nervous system and reduce perceived stress in the context of a “workplace” setting. We also sought to determine if the theme of guided imagery plays an important role in reducing stress. To that end, we compared a forest-themed guided imagery exercise, an urban-themed guided imagery exercise, and a “control” condition wherein participants were asked to sit quietly for 10 minutes. Given the previous research involving the effects of nature on physiological stress, we hypothesized that both guided imagery conditions would result in significant improvements in self-reported mood and stress, as well as physiological measures of stress, in contrast to the control condition. Furthermore, we hypothesized the forest-themed guided imagery exercise would have the strongest effect on reducing both perceived stress and mood and physiological stress compared to the urban-themed guided imagery exercise. The control exercise was hypothesized to have minimal, if any, effect on self-report and physiological measures of stress. Lastly, the current study sought to explore the extent to which childhood geographic location (on a spectrum from rural to urban) may account for variability in stress over time, depending on guided imagery theme.

## CHAPTER 3

### METHOD

#### Participants

A total of 113 undergraduate students were recruited from the SONA online recruitment system used by the psychology department at Georgia Southern University, and final analyses included all participants with a 100% completion rate ( $n = 105$  participants; 93% of the sample). Assuming a medium effect size, we needed 108 participants (approximately 36 participants for each level of the IVs) for adequate power. One participant did not respond to any questions, and four participants did not receive questionnaires for The Four Clever Brothers (Grimm Brothers, 1905); thus, data from these five participants were not used. Of note, 100 participants received only three of the LSAT questions. For these reasons, only the results presented in this study should be interpreted with caution.

Participant age ranged from 18 to 38 years ( $M = 19.42$  years;  $SD = 2.65$ ). A majority of participants identified as female ( $n = 79$ ; 73.1%), and the remainder identified as male ( $n = 28$ ; 25.9%). Self-reported race/ethnicity included White/European-American ( $n = 64$ ; 59.3%), Black/African-American ( $n = 25$ ; 23.1%); Asian/Pacific Islander ( $n = 7$ ; 6.5%); Hispanic/Latinx ( $n = 8$ ; 7.4%); and Biracial/Multiracial ( $n = 3$ ; 2.8%). Self-reported relationship status included Single/Never Married ( $n = 78$ ; 72.2%); In a Relationship ( $n = 26$ ; 24.1%); Married ( $n = 1$ ; 0.9%); and Divorced ( $n = 1$ ; 0.9%). Additionally, on a scale from Rural to Non-rural, more participants rated their childhood geographic location as more non-rural (52%) and their current geographic location (59%) as more non-rural.

#### Materials

**Forest guided imagery (Appendix A).** Condition 1 consisted of a guided imagery exercise adapted from a forest-themed guided imagery exercise available from innerhealthstudio.com (Raudebaugh, n.d.). The script, as recorded, was 10 minutes long.

**Urban guided imagery (Appendix B).** Condition 2 consisted of a guided imagery exercise adapted from the forest-themed exercise described above and altered to guide the participant through a visualization of a city. The script, as recorded, was 10 minutes long.



**Control script (Appendix C).** Participants in the control group listened to a script instructing them to sit quietly for 10 minutes.

**General experiences of depression, anxiety, and stress (Appendix D).** The Depression, Anxiety, Stress Scale (DASS-21) consists of three self-report scales designed to measure the emotional states of depression, anxiety, and stress (Lovibond & Lovibond, 1995). Each of the three DASS-21 scales contains 7 items. The Depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, loss of interest/involvement, anhedonia, and inactivity. The Anxiety scale assesses autonomic arousal, somatic effects, situational anxiety, and subjective experience of anxiety. The Stress scale assesses difficulty relaxing, nervous arousal, and irritability, emotional reactivity, and impatience. Participants use a 4-point scale to rate the extent to which they have experienced each state over the past week. The three subscales of the DASS-21 demonstrate good internal consistency ( $\alpha = .90$  for Depression,  $.83$  for Anxiety, and  $.86$  for Stress) in college student populations (Mahmoud, Hall, & Staten, 2010). The DASS was administered prior to the stress task and guided imagery task. In the current study, the Stress ( $\alpha = .79$ ) and Depression ( $\alpha = .84$ ) scales demonstrated adequate reliability, while the Anxiety scale ( $\alpha = .68$ ) fell slightly below acceptable standards and should be interpreted with caution.

**Mood and stress (Appendix E).** Participants rated their mood and stress on a sliding scale from *very unpleasant mood* to *very pleasant mood* and *very stressed* to *not at all stressed* by marking on a line two separate times during the experiment: at “baseline” prior to the stress task, and again post-guided imagery exercise. The scores were then quantified by using a ruler to convert each mark to a number. Numerical scores ranged from 0 to 6.19, with lower scores representing lower mood and higher stress, and higher scores representing higher mood and lower stress. Reliability analyses were not conducted, given each measure consisted of a single-item respectively.

**Measures of physiological stress.** Participants’ physiological stress response (i.e., heart rate) was measured with the Neulog heart rate and pulse logger sensor (NUL-208). Due to technical difficulties involving time-stamping, this data was not used for the current study. Baseline, reactions to the ego-

depletion task, and reactions to the guided imagery scenes were unable to be properly identified throughout the duration of the experiment.

**Ego-depletion task (Appendices F & G).** A task designed for ego depletion was used to induce stress in the form of mental fatigue (Steele, 2016). The dual-task consisted of having participants complete items from the Law School Admission Test, or LSAT, (Appendix F) while simultaneously listening to an audio recording of “The Four Clever Brothers” by the Grimm Brothers (Appendix G). Participants were then tasked with answering questions about the “The Four Clever Brothers.” The LSAT is a standardized measure of reading and verbal reasoning skills designed for law school admissions, and its complexity would require individuals to focus their attention on the test items. The Grimm Brothers’ story was selected because of its complexity, length, and unrelated nature to the LSAT question. The ego-depletion task lasted approximately 10.5 minutes with instructions and was chosen to mimic mental fatigue in the workplace.

This task was chosen because of the similarities between ego depletion and mental fatigue. *Ego depletion* occurs when a person overexerts their self-control. This overexertion can lead to decreased impulse control, decreased motivation to perform tasks, and increased aggression (Baumeister et al., 1998; Dewall et al., 2007). Similarly, *mental fatigue* is a state induced by placing demands on cognitive activity, and can influence a person’s cognitive and physical performance when completing tasks (Marcora et al., 2009).

**Demographics (Appendix H).** Participants reported their age, sex, race/ethnicity, marital status, education level, and geographical location (rural/urban) of their childhood residence and their current residence. Specifically, rurality was assessed by asking participants to report their childhood environment and current environment using sliding scales from *rural* to *urban*. The scores were then quantified by using a ruler to convert each mark to a number. Numerical scores ranged from 0 to 6.19, with lower scores representing more rural environments and higher scores representing more urban environments.

## **Procedure**

Participants individually completed this in-person experiment in a laboratory setting housed within the Psychology Department at Georgia Southern University, Statesboro campus. Prior to beginning the study, each participant was randomly assigned to one of three conditions: (1) forest-themed guided imagery, (2) urban-themed guided imagery, and (3) control condition.

Researchers obtained written consent from each participant which included a review of possible minimal risks involved with participation in this research (Appendix I). Additionally, detailed instructions were given before each step in the procedure. Each participant had a heart rate monitor attached to the little finger of their non-dominant hand prior to beginning the experiment. Once the monitor was attached, researchers would wait five minutes to record a baseline heart rate. After physiological measures were established, the participant completed paper-and-pencil questionnaires (i.e., DASS-21 and self-report measures of mood and stress at baseline) before the ego-depletion task. Participants in each condition were asked to perform a 10.5-minute ego-depletion task consisting of answering a Law School Admission Test (LSAT) question while simultaneously listening to audio as distraction. Following the ego-depletion task, depending on their randomly assigned condition, participants were asked to engage in either a 10-minute forest-themed guided-imagery exercise (Condition 1), a 10-minute urban-themed guided-imagery exercise (Condition 2), or were asked to sit quietly for 10 minutes (Condition 3; control). Immediately following the guided imagery condition, participants completed self-report measures of mood and stress and were disconnected from the heart rate monitor. All participants were asked to provide demographics data in the last portion of the experiment. After completing all measures and tasks, participants were fully debriefed of the study's purposes and awarded 1.5 extra credit points for their time.

## **Statistical Analyses Plan**

Descriptive statistics were conducted to describe important sample characteristics. Preliminary analyses were conducted to examine relationships among key variables in the study, including psychological distress, rurality, and current mood using Pearson bivariate correlational analyses. A two-

way mixed methods MANOVA was conducted to test the main aim of the study; that is, to determine if theme of guided imagery (forest-themed, urban themed, and control) influences self-reports of stress and mood over time (baseline and post-guided imagery task). In the two-way mixed MANOVA, condition (forest, urban, control) was the independent variable (IV), and baseline and post-guided imagery measures of self-reported stress and mood were the dependent variables (DVs). It is important to note that if the variable geographic location in childhood was significantly correlated with mood and stress, a mixed methods MANCOVA would be conducted instead, with geographic location as a covariate to determine its ability to capture variability in mood and stress over time; however, no significant correlation was found with geographic location and other variables, so this particular analysis was not warranted.

## CHAPTER 4

## RESULTS

**Preliminary Analyses**

Descriptive statistics of the sample, including means and standard deviations of key measures included in the study, can be found in Table 1.

Table 1

*Means and Standard Deviations for Baseline Mood and Stress, DASS subscales, and Geographic Location*

	<i>M</i>	<i>SD</i>
Baseline Mood	4.25	1.31
Baseline Stress	3.22	1.76
DASS-21-Anxiety	3.95	3.32
DASS-21-Stress	6.57	4.06
DASS-21-Depression	3.63	3.57
Geographic Location-Child	2.97	1.99
Geographic Location-Current	3.46	1.86

Bivariate correlational analyses assessed linear relationships among key variables in the study, including baseline mood and stress, as well as psychological distress (as measured by the DASS-21) and geographic location (childhood and current). Geographic location, both in childhood and current residence, was not significantly correlated with self-reported measures of mood or stress, including subscales of the DASS-21. Self-reported mood and stress were significantly and negatively correlated with the DASS-21 Depression and Stress subscales, and self-reported stress was also moderately and negatively correlated with the DASS-21 Anxiety subscale. See Table 2 for a full report of correlational results.

Table 2

*Correlations for Baseline Measures of Mood and Stress, Three DASS Subscales, and Geographic Location*

	1	2	3	4	5	6	7
1. Baseline Mood	-						
2. Baseline Stress	.344**	-					
3. DASS-Anxiety	-.191	-.363**	-				
4. DASS-Depression	-.355**	-.456**	.556**	-			
5. DASS-Stress	-.332**	-.531**	.681**	.611**	-		
6. Geographic Location-Child	-.020	.141	-.194*	-.156	-.065	-	
7. Geographic Location-Current	.040	.050	-.112	.025	.054	.400**	-

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

### **The Effects of Guided Imagery and Rurality on Stress and Mood**

The effectiveness of guided-imagery theme on self-reported mood and stress was analyzed using a two-way mixed methods MANOVA. Prior to analysis, homogeneity of variance-covariance was reviewed using Box's  $M$  and deemed to be non-significant at  $\alpha = .001$ , indicating the assumption of homogeneity was met. Levene's Test of Equality of Error Variances revealed nonsignificant results ( $p < .05$ ) for three (pre- and post-stress, and pre-mood variable) of the four variables; the post-mood variable was found to be significant at  $p = .01$ , suggesting inequality of variance. A log transformation of the post-mood variable was considered but due to mixed views regarding its use in practice, the original variable was used in the analysis (Feng et al., 2014).

Findings showed no significant main effect of condition on the combined dependent variables,  $F(4, 204) = 1.20, p = .31, \eta_p^2 = .02$ . Analysis of the dependent variables individually showed an overall effect of time,  $F(2, 101) = 20.22, p < .001, \eta_p^2 = .29$ . Specifically, self-reported stress from baseline (overall  $M = 3.22$ ) to post-test (overall  $M = 4.15$ ) decreased significantly,  $F(2, 102) = 34.18, p < .001$ .

Additionally, mood significantly improved from baseline (overall  $M = 4.25$ ) to post-test (overall  $M = 4.58$ ),  $F(2, 102) = 7.26, p < .001$ . Lastly, no significant interaction was found between condition and time,  $F(4, 204) = .941, p = .44, \eta_p^2 = .02$ . These findings suggest that mood improved, and stress decreased over time regardless of condition assignment. See Table 3 for descriptive statistics across conditions, and Graphs 1 and 2 for depictions of mood and stress ratings over time.

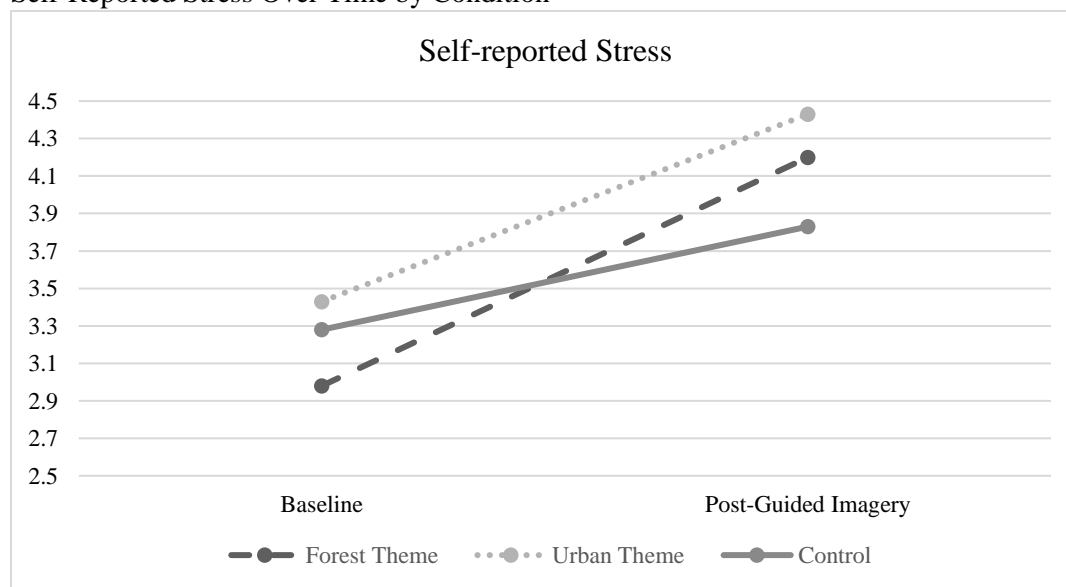
Table 3

*Means and Standard Deviations for Mood and Stress across Conditions*

	Forest		Urban		Control	
	M	SD	M	SD	M	SD
Baseline Stress	2.98	1.69	3.43	1.83	3.28	1.79
Posttest Stress	4.20	1.53	4.43	1.72	3.83	1.69
Baseline Mood	3.92	1.38	4.45	1.24	4.37	1.27
Posttest Mood	4.31	1.68	4.89	1.23	4.55	.94

Graph 1

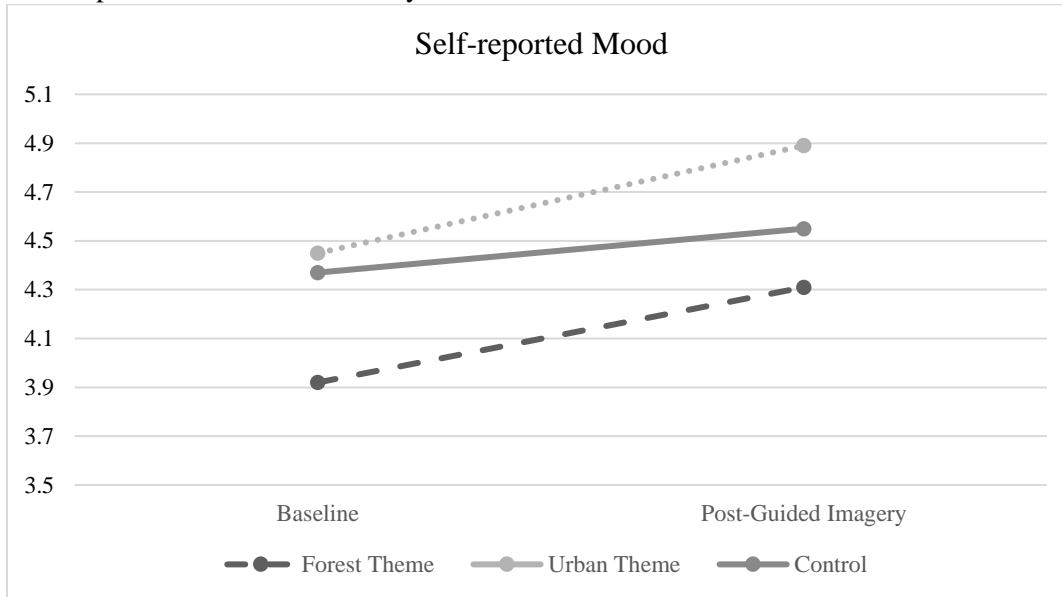
Self-Reported Stress Over Time by Condition



*Note: Higher scores indicate less perceived stress.*

Graph 2

Self-Reported Mood Over Time by Condition



*Note: Higher scores indicate more positive mood.*



## CHAPTER 5

### DISCUSSION

Despite the wealth of research surrounding guided imagery, little attention to date has been placed on the effect of theme of guided imagery exercises on perceived stress and mood. The primary purpose of this study was to examine the effect of guided imagery interventions on perceived stress, and more specifically determine whether the theme of the guided imagery exercise differentially impacts stress reduction and improves mood. The current literature indicates mindfulness-based techniques (Grossman, Niemann, Schmidt, & Walach, 2004; Janssen, Heerkens, Kuijer, van der Heijden, & Engels, 2018), guided imagery techniques (Bigham, McDannel, Luciano, & Salgado-Lopez, 2014; Utay & Miller, 2006; Weigensberg et al., 2009), and natural settings (Kaplan, 1995; Lee et al., 2011; McCaffrey & Liehr, 2016; Toda et al., 2013; Ulrich et al., 1991) can help individuals recover from mental fatigue and other forms of psychological and physiological stress.

Additionally, there are gaps in the literature regarding the possible influence of rurality on psychological distress and guided imagery. A secondary purpose of this study was to examine possible relationships between childhood geographical location, self-reports of psychological distress, and guided imagery. To test the main aims of this study, we sought to induce a stress response in participants in the form of mental fatigue via an ego-depletion task and measure the extent to which individuals were able to recover based on their assigned condition.

#### **Ego Depletion and Mental Fatigue**

Mental fatigue has been found to interfere with effective cognitive functioning, self-control, motivation for task completion, and has been linked to impulsivity, irritability, and anxiety (Kaplan, 1995; Marcora, Staiano & Manning, 2009). A task designed to deplete ego was chosen in this study because ego depletion seems to equate with mental fatigue as a form of psychological distress. Many common workday tasks have been found induce ego depletion, leading to decreased mood, increased physiological and perceived stress, and overall negative affect (Steele, 2016; Tice, Bratslavsky, & Baumeister, 2001; Wright et al., 2007). Individuals who experience ego depletion also tend to act more

impulsively as a means of instant gratification to help overcome psychological distress (Tice, Bratslavsky, & Baumeister (2001).

The specific ego-depletion task in this study was shown by Steele (2016) to be an effective method of inducing ego depletion; however, in the absence of a manipulation check in the current study, it cannot be stated with certainty that the ego-depletion task served as an effective method of inducing mental fatigue. Since there was a reduction in reported stress, though, it is possible the ego-depletion task was effective enough to significantly increase perceived stress. Thus, it is reasonable to assume – in light of significant stress reduction – that the ego-depletion task was effective, but results should be interpreted with caution.

### **Guided Imagery and Psychological Distress**

A significant negative correlation was found between measures of baseline mood and stress, in that individuals who reported higher self-report measures of mood and stress (indicative of *greater* pleasant feelings and *less* experiences of stress) tended to report lower levels of distress on the DASS-21 subscales of Stress and Depression. These findings are consistent with a body of literature suggesting a connection between stress and mood. Of note, Duman and Monteggia (2006) studied the effect of stress on brain-derived neurotrophic factor (BDNF) in the limbic system and concluded that stress decreases the amount of BDNF. The decrease of BDNF was shown to correlate with reported decrease in mood. Similarly, Gold and Chrousos (2002) noted that stress can precede symptoms of depression, and that the stress response itself consists of varying levels of anxiety.

As expected, self-report measures of mood and stress changed significantly over time; however, contrary to expectations, this effect was seen across all conditions relatively equally. Several possibilities may explain this main effect. First, it is possible that baseline mood and stress as reported by participants may have been negatively affected by the laboratory setting, and the perceived improvement in mood and stress may have been an effect of participants habituating to that setting (Thompson & Spencer, 1966 as cited by Grissom & Bhatnagar, 2009). A second explanation involves the simple act of shifting attention; that is, participants in each condition may have shifted their attention to something other than the

laboratory environment. The shifting of attention fits with Attention Restoration Theory as described by Kaplan (1995) and could have led to the significant improvements in mood and stress. Although Kaplan focused on shifting attention to a natural setting, a broader conclusion could be made that shifting one's attention to something more pleasing to the individual could have a similar effect on attention restoration and, subsequently, on improving perceived mood and stress.

Contrary to a primary hypothesis of the current study, guided imagery theme did not appear to have a more significant impact on participants experience of psychological stress over time as compared to the control; all conditions improved in similar ways. Previous research has shown guided imagery to be effective in relieving perceived stress, building new skills, improving motivation and performance in sports, and lowering heart rate after stressful tasks (Bigham, McDannel, Luciano, & Salgado-Lopez, 2014; Melville et al., 2012; Utay & Miller, 2006; Weigensberg et al., 2009). Although the current findings do not support the main hypothesis, they do suggest that taking a 10-minute break from work may be just as beneficial for reducing perceived stress and improving mood when compared to guided imagery. In support of this explanation, Tyler and Burns (2008) found 10 minutes of rest from workday tasks can be enough to help someone overcome the effects of ego depletion. Similarly, research into mindfulness has shown sitting quietly and focusing on the present moment can induce a relaxed state in many people (Kabat-Zinn, 1990), and Janssen and colleagues (2018) indicated MBSR may lead to decreased levels of emotional exhaustion, stress, depression, and anxiety. In this study, each condition may have functioned as either a form of mindfulness meditation, or a break from work – either of which could account for reduced stress and improved mood.

### **Psychological Distress and Rurality**

A final goal of the current study was to explore the relationship between geographic location, guided imagery theme, and psychological distress; specifically, exploring whether someone from a rural area may perceive greater benefit from a forest-themed imagery exercise compared to someone from an urban area. Bivariate correlations show no significant relationship between an individual's geographic

location (childhood and current) or self-reported mood and stress. These results indicate that neither childhood nor current geographic location significantly impact perceived mood and stress.

While it is important to study mental health among rural Americans because of the barriers to healthcare faced by many (e.g., cultural and financial barriers; Douthit, Kiv, Dwolatzky, & Biswas, 2015), the current findings suggest rurality does not appear to be a key factor in the effectiveness of guided imagery interventions on reducing stress and improving mood. Even though rural individuals may have more experience with nature, prior experience does not seem to have a significant impact on the effectiveness of guided imagery. These findings are important in terms of intervention selection. That is, clinicians in both rural and urban areas could teach clients to use guided imagery or other relaxation techniques as a means of helping the client take a short break throughout their workday.

### **Limitations and Future Directions**

Although the current study contributes to the vast research on guided imagery, some notable limitations can be found throughout. Initially, physiological data in the form of participant heart rate was to be included as an objective measure of stress. The current research took place across two different laboratory settings, and minor differences in the implementation of each step of the experiment prevented researchers from recording participant heart rate at prescribed moments. Therefore, heart rate data could not be included as researchers could not obtain an accurate timestamp for each participant's heart rate before and after key experimental tasks (i.e., before and after the ego-depletion task and the guided imagery task). As a result, we could not accurately determine whether the ego-depletion task and guided imagery exercise had any effect on participant heart rate. In this case, greater familiarization with the heart rate monitor's programming and stricter adherence to the scheduled timeline during the protocol could have been helpful in obtaining the desired data.

Additionally, it can be difficult to accurately simulate a workplace environment in a laboratory setting. There were not as many distractions as one might expect to find in an office setting, and participants may not have found the laboratory setting to be as distracting or distressing as a workplace setting. Future research in this area could involve greater distractions in more realistic contexts during the

ego-depletion task. Moreover, baseline mood and stress as reported by each participant may have been influenced by the laboratory setting, and the perceived improvement in mood and stress may have been an effect of participants becoming more comfortable with the laboratory setting.

Technical difficulties also resulted in the majority of participants receiving an ego-depletion task with fewer LSAT questions than intended. Since mood and stress were not assessed immediately following the ego-depletion task, it cannot be known with certainty that the task induced ego depletion and mental fatigue effectively. Consequently, this means it cannot be known with certainty if the guided imagery exercises had the desired effect of helping participants recover from mental fatigue or reducing their perceived stress. Although determining the efficacy of the ego-depletion task was not a priority of the current research, future research should include a manipulation check immediately following the ego-depletion task to ensure the task had the intended effect of increasing perceived stress. Additionally, the distractor was a Grimm Brothers story recorded by the same reader who recorded our guided imagery scripts, which could have unintended effects on the two tasks.

The amount of time normally spent engaging in mindfulness activities, guided imagery, or similar relaxation techniques in their daily lives was not accounted for, and varying levels of experience could have impacted the results in unknown ways. Participants who regularly practice mindfulness, guided imagery, or other relaxation techniques may not have perceived the ego-depletion task to be distressing. Alternatively, experienced participants in the control group may have practiced their preferred relaxation exercises when asked to sit quietly, or they may have been daydreaming, which could also be considered a form of imagery. Future research should include assessments of experience with various forms of mindfulness activity, along with inquiries of participants' experiences of the guided imagery task following experiment to determine the extent to which they followed directions. Future research should also consider simulating "work as usual" as a control condition—perhaps having the control group answer additional questions related to the task. By doing this, researchers could gain a clearer understanding of the effectiveness of guided imagery and other relaxation techniques.

It should also be noted the guided imagery exercises chosen for this study included deep breathing throughout the exercise. Deep breathing was not included in the control condition, so it is not known how the deep breathing aspect influenced the results. Future research could include a deep-breathing condition, in addition to a “work as usual” control condition. In contrast, the scripts used in this study could exclude the deep breathing instruction altogether as a way to focus specifically on one “active ingredient,” that being guided imagery *only*. Likewise, future research should include scales as part of the debriefing to ascertain how participants felt after the ego-depletion task and after the experimental and control conditions.

It should be noted that the current research was conducted with a sample of university students who did not report significant symptoms of depression or anxiety. Future research in this area could be expanded to include clinical populations diagnosed with anxiety or depressive disorders. Additionally, this research could be adapted into a longitudinal study assessing the effect of a longer-term guided-imagery program. Such a program may show more significant results, especially among clinical populations, since participants would have more time to learn and practice relaxation skills.

Additionally, future research should include posttest assessments rating each participant’s perception of the guided imagery exercise and the ego-depletion task. Assessments could ask participants to rate how much they were able to relax, how vivid they found the guided imagery, how well they were able to visualize the image, and how stressed the ego-depletion task made them. Likewise, researchers could assess each participant’s previous experience with guided imagery and their childhood experiences with being outdoors.

### **Conclusion and Clinical Implications**

This research contributes to the small existing body of literature regarding rural America, guided imagery, and mindfulness-based practices. The primary aim of this study was to examine the effect of guided imagery interventions, with a specific focus on theme, on psychological distress. A secondary aim was to determine the role of geographic location on the experience of distress, but also the effectiveness of guided imagery intervention.

The results of the current study indicate that some form of relaxation exercise may be beneficial for people experiencing psychological distress, but the specific type of relaxation exercise may not be as important. Additionally, no significant relationship between geographic location, guided imagery, and psychological distress were found. Thus, rural individuals may have more experience with nature, but prior experience does not seem to have importance in relation to guided imagery. Future research could be done to assess rural Americans' attitudes toward mindfulness, guided imagery, and similar practices. Such research could help guide treatment planning for clinicians working in rural areas.

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## APPENDIX A

**Forest Guided Imagery**

**Instructions:** We are going to give you a scenario in which to imagine yourself. After the scenario we would like to ask you some questions about your experience. (*Pause for about 5 seconds*). Please find a comfortable position and close your eyes. Please let me know when you are ready to begin by lifting your index finger. (*Wait until prompted to start*).

Imagine yourself walking on a path through a forest. The path is soft beneath your shoes, a mixture of soil, fallen leaves, pine needles, and moss. As you walk, your body relaxes and your mind clears, more and more with each step you take.

Breathe in the fresh air, filling your lungs completely. Now exhale. Breathe out all the air. Feeling refreshed.

Take another deep breath in... and breathe out completely, letting your body relax further.

Continue to breathe slowly and deeply as you walk through the forest.

The air is warm and comfortable. Sun filters through the trees, making a moving dappled pattern on the ground before you.

Listen to the sounds of the forest... Birds singing. A gentle breeze blowing. The leaves on the trees shift and sway in the soft wind.

Your body relaxes more and more as you walk. Count your steps and breathe in unison with your strides.

Breathe in 2, 3, 4... hold 2, 3...exhale 2, 3, 4, 5.

Breathe in 2, 3, 4... hold 2, 3...exhale 2, 3, 4, 5.

Continue to breathe like this, slowly and deeply, as you become more and more relaxed.

As you walk through the forest, feel your muscles relaxing and lengthening. As your arms swing in rhythm with your walking, they become loose, and relaxed.

Feel your back relaxing as your spine lengthens and the muscles relax. Feel the tension leaving your body as you admire the scenery around you.

As you continue to walk through the forest, you begin to climb up a slight incline. You easily tread along smooth rocks on the path. Feeling at one with nature.

The breeze continues to blow through the treetops, but you are sheltered on the path, and the air around you is calm.

Small saplings grow at the sides of the path.

Tall trees grow on either side of the path. Picture the variety of trees around you. Some have smooth, white bark. Others are darker, with coarse, heavy bark, deeply grooved. Enjoy the colors of the bark on the trees - white, brown, black... many combinations of color. You admire the rough, brown bark of pine trees and enjoy the fresh pine scent.

The air around you is fresh, and filled with the scent of trees, soil, and streams.

As you continue walking through the forest, you can hear the sound of water faintly in the distance. The gentle babbling sound of a creek.

As you continue walking, you get closer to the sound of a running stream.

The path curves up ahead. You can see sunlight streaming onto the path, and you hear the stream, very close now.

As you round the corner, you see a clearing in the trees up ahead. You are growing tired from your journey. Your body feels pleasantly tired and heavy.

Imagine yourself walking toward the clearing and the stream. Up ahead is a large, smooth rock... like a chair waiting for you to rest. The rock is placed perfectly near the edge of the stream.

Sit or lie down on the rock if you wish. You feel very comfortable and at ease. The sun shines down on you.

Feel the sun warming your body as you relax on the rock. Enjoy the landscape around you and feel your body relaxing even more.

Your body becomes very warm, and very heavy.

Continue to breathe the fresh, clean air.

You feel so relaxed.

At peace.

In unity with nature around you.

Enjoy this peaceful place.

*(pause...)*

When you are ready to leave this peaceful place, slowly begin to reawaken your body.

Know that you can return to this forest in your imagination whenever you like.

As you reawaken, keep with you the feeling of calm, peace, and relaxation.

When you are ready, open your eyes and return to full wakefulness, feeling alert and refreshed.

Thank you for your time and patience. I would like to check your heart rate one more time. *(After recording HR)* Please complete these final measures (Self-report, Demographics).

*(Conduct debriefing after the measures are completed)*



## APPENDIX B

Urban Guided Imagery

**Instructions:** We are going to give you a scenario in which to imagine yourself. After the scenario we would like to ask you some questions about your experience. (*Pause for about 5 seconds*). Please find a comfortable position and close your eyes. Please let me know when you are ready to begin by lifting your index finger. (*Wait until prompted to start*).

Imagine yourself walking on a sidewalk through a city. The white concrete is firm and stable beneath your shoes. As you walk, your body relaxes and your mind clears, more and more with each step you take.

Breathe in the fresh air, filling your lungs completely. Now exhale. Breathe out all the air. Feeling refreshed.

Take another deep breath in... and breathe out completely, letting your body relax further.

Continue to breathe slowly and deeply as you walk through the city.

The air is warm and comfortable. The sun shines around the tall buildings, making a steady pattern of shading on the ground before you.

Listen to the sounds of the city... Birds singing, cars driving, people talking. A gentle breeze is blowing. Your body relaxes more and more as you walk. Count your steps and breathe in unison with your strides.

Breathe in 2, 3, 4... hold 2, 3...exhale 2, 3, 4, 5.

Breathe in 2, 3, 4... hold 2, 3...exhale 2, 3, 4, 5.

Continue to breathe like this, slowly and deeply, as you become more and more relaxed.

As you walk through the city, feel your muscles relaxing and lengthening. As your arms swing in rhythm with your walking, they become loose, and relaxed.

Feel your back relaxing as your spine lengthens and the muscles relax. Feel the tension leaving your body as you admire the scenery around you.

As you continue to walk through the city, you begin to climb up a slight incline. You easily tread along the smooth concrete on your path. Feeling at one with the city.

The breeze continues to blow between the buildings, but you are sheltered on your path, and the air around you is calm.

Small shops are at one side of the path.

Tall skyscrapers are on the other side of the path, across a street that is not heavily traveled. Picture the variety of buildings around you. Some have smooth, dark windows. Others are lighter, with coarse, deeply grooved concrete. Enjoy the look of the different buildings - white, brown, black... many combinations of color and texture.

As you continue walking through the city, you notice the smells of a café or bakery.

As you continue walking, you get closer to the smell of freshly baked pastries freshly brewed coffee. The path curves up ahead. You can see sunlight streaming onto the path, and you smell the café, very close now.

As you round the corner, you see the café and an open table outside. You are growing tired from your journey. Your body feels pleasantly tired and heavy.

Imagine yourself walking toward the café and the open table. The chair seems to be waiting just for you. The chair is placed perfectly so that the sun will not shine in your eyes.

Sit down in the chair if you wish. You feel very comfortable and at ease. The sun shines down on you.

Feel the sun warming your body as you relax in the chair. Enjoy the landscape around you and feel your body relaxing even more.

Your body becomes very warm, and very heavy.

Continue to breathe the fresh air.

You feel so relaxed.

At peace.

In unity with the city around you.

Enjoy this peaceful place.

*(pause...)*

When you are ready to leave this peaceful place, slowly begin to reawaken your body.

Know that you can return to this city in your imagination whenever you like.

As you reawaken, keep with you the feeling of calm, peace, and relaxation.

When you are ready, open your eyes and return to full wakefulness, feeling alert and refreshed.

Thank you for your time and patience. I would like to check your heart rate one more time. *(After recording HR)* Please complete these final measures (Self-report, Demographics).

*(Conduct debriefing after the measures are completed)*

## APPENDIX C

## Control Script

For the final part of this process, we ask that you take the next 10 minutes to sit quietly in your seat. Please keep your cell phone put away during this time. I will give you further instructions after the five minutes and will be happy to answer your questions at that time.

*(After 10 minutes)*

Thank you for your time and patience. I would like to check your heart rate one more time. *(After recording HR)* Please complete these final measures (Self-report, Demographics).

*(Conduct debriefing after the measures are completed)*

## APPENDIX D

DASS21	Name:	Date:			
<p>Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you <i>over the past week</i>. There are no right or wrong answers. Do not spend too much time on any statement.  <i>The rating scale is as follows:</i></p> <p>0 Did not apply to me at all            1 Applied to me to some degree, or some of the time            2 Applied to me to a considerable degree, or a good part of time            3 Applied to me very much, or most of the time</p>					
1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

## APPENDIX E

Please place an X on each of the lines below to indicate your present mood/stress.

**Overall, my current mood is:**

Very  
Unpleasant

Very  
Pleasant

---

**Overall, my current level of stress is:**

Very  
Stressed

Not at All  
Stressed

---

## APPENDIX F

## LSAT LOGIC AND REASONING ASSESSMENT

A community center will host six arts-and-crafts workshops- Jewelry, Kite-making, Needlepoint, Quilting, Rug-making, and Scrapbooking. The workshops will be given on three consecutive days: Wednesday, Thursday, and Friday. Each workshop will be given once, and exactly two workshops will be given per day, one in the morning and one in the afternoon. The schedule for the workshops is subject to the following constraints:

- Jewelry must be given in the morning, on the same day as either Kite-making or Quilting.
- Rug-making must be given in the afternoon, on the same day as either Needlepoint or Scrapbooking.
- Quilting must be given on an earlier day than both Kite-making and Needlepoint.

1. Which one of the following is an acceptable schedule for the workshops, with each day's workshops listed in the order in which they are to be given?
  - a) Wednesday: Jewelry, Kite-making  
Thursday: Quilting, Scrapbooking  
Friday: Needlepoint, Rug-making
  - b) Wednesday: Jewelry, Quilting  
Thursday: Kite-making, Needlepoint  
Friday: Scrapbooking, Rug-making
  - c) Wednesday: Quilting, Needlepoint  
Thursday: Scrapbooking, Rug-making  
Friday: Jewelry, Kite-making
  - d) Wednesday: Quilting, Scrapbooking  
Thursday: Jewelry, Kite-making  
Friday: Rug-making, Needlepoint
  - e) Wednesday: Scrapbooking, Rug-making  
Thursday: Quilting, Jewelry  
Friday: Kite-making, Needlepoint
2. Which one of the following workshops CANNOT be given on Thursday morning?
  - a) Jewelry
  - b) Kite-making
  - c) Needlepoint
  - d) Quilting
  - e) Scrapbooking
3. Which one of the following pairs of workshops CANNOT be the ones given on Wednesday morning and Wednesday afternoon, respectively?
  - a) Jewelry, Kite-making
  - b) Jewelry, Quilting
  - c) Quilting, Scrapbooking
  - d) Scrapbooking, Quilting

- e) Scrapbooking, Rug-making
4. If Kite-making is given on Friday morning, then which one of the following could be true?
- a) Jewelry is given on Thursday morning.
  - b) Needlepoint is given on Thursday afternoon.
  - c) Quilting is given on Wednesday morning.
  - d) Rug-making is given on Friday afternoon.
  - e) Scrapbooking is given on Wednesday afternoon.
5. If Quilting is given in the morning, then which one of the following workshops CANNOT be given on Thursday?
- a) Jewelry
  - b) Kite-making
  - c) Needlepoint
  - d) Rug-making
  - e) Scrapbooking
6. How many of the workshops are there that could be the one given on Wednesday morning?
- a) One
  - b) Two
  - c) Three
  - d) Four
  - e) Five

## APPENDIX G

## RECORDED NARRATIVE

**Four Clever Brothers -The Brother's Grimm**

'Dear children,' said a poor man to his four sons, 'I have nothing to give you; you must go out into the wide world and try your luck. Begin by learning some craft or another, and see how you can get on.' So the four brothers took their walking-sticks in their hands, and their little bundles on their shoulders, and after bidding their father goodbye, went all out at the gate together. When they had got on some way they came to four crossways, each leading to a different country. Then the eldest said, 'Here we must part; but this day four years we will come back to this spot, and in the meantime each must try what he can do for himself.'

So each brother went his way; and as the eldest was hastening on a man met him, and asked him where he was going, and what he wanted. 'I am going to try my luck in the world, and should like to begin by learning some art or trade,' answered he. 'Then,' said the man, 'go with me, and I will teach you to become the cunningest thief that ever was.' 'No,' said the other, 'that is not an honest calling, and what can one look to earn by it in the end but the gallows?' 'Oh!' said the man, 'you need not fear the gallows; for I will only teach you to steal what will be fair game: I meddle with nothing but what no one else can get or care anything about, and where no one can find you out.' So the young man agreed to follow his trade, and he soon showed himself so clever, that nothing could escape him that he had once set his mind upon.

The second brother also met a man, who, when he found out what he was setting out upon, asked him what craft he meant to follow. 'I do not know yet,' said he. 'Then come with me, and be a star-gazer. It is a noble art, for nothing can be hidden from you, when once you understand the stars.' The plan pleased him much, and he soon became such a skillful star-gazer, that when he had served out his time, and wanted to leave his master, he gave him a glass, and said, 'With this you can see all that is passing in the sky and on earth, and nothing can be hidden from you.'

The third brother met a huntsman, who took him with him, and taught him so well all that belonged to hunting, that he became very clever in the craft of the woods; and when he left his master he gave him a bow, and said, 'Whatever you shoot at with this bow you will be sure to hit.'

The youngest brother likewise met a man who asked him what he wished to do. 'Would not you like,' said he, 'to be a tailor?' 'Oh, no!' said the young man; 'sitting cross-legged from morning to night, working backwards and forwards with a needle and goose, will never suit me.' 'Oh!' answered the man, 'that is not my sort of tailoring; come with me, and you will learn quite another kind of craft from that.' Not knowing what better to do, he came into the plan, and learnt tailoring from the beginning; and when



he left his master, he gave him a needle, and said, 'You can sew anything with this, be it as soft as an egg or as hard as steel; and the joint will be so fine that no seam will be seen.'

After the space of four years, at the time agreed upon, the four brothers met at the four cross-roads; and having welcomed each other, set off towards their father's home, where they told him all that had happened to them, and how each had learned some craft.

Then, one day, as they were sitting before the house under a very high tree, the father said, 'I should like to try what each of you can do in this way.' So he looked up, and said to the second son, 'At the top of this tree there is a chaffinch's nest; tell me how many eggs there are in it.' The star-gazer took his glass, looked up, and said, 'Five.' 'Now,' said the father to the eldest son, 'take away the eggs without letting the bird that is sitting upon them and hatching them know anything of what you are doing.' So the cunning thief climbed up the tree, and brought away to his father the five eggs from under the bird; and it never saw or felt what he was doing, but kept sitting on at its ease. Then the father took the eggs, and put one on each corner of the table, and the fifth in the middle, and said to the huntsman, 'Cut all the eggs in two pieces at one shot.' The huntsman took up his bow, and at one shot struck all the five eggs as his father wished.

'Now comes your turn,' said he to the young tailor; 'sew the eggs and the young birds in them together again, so neatly that the shot shall have done them no harm.' Then the tailor took his needle, and sewed the eggs as he was told; and when he had done, the thief was sent to take them back to the nest, and put them under the bird without its knowing it. Then she went on sitting, and hatched them: and in a few days they crawled out, and had only a little red streak across their necks, where the tailor had sewn them together.

'Well done, sons!' said the old man; 'you have made good use of your time, and learnt something worth the knowing; but I am sure I do not know which ought to have the prize. Oh, that a time might soon come for you to turn your skill to some account!'

Not long after this there was a great bustle in the country; for the king's daughter had been carried off by a mighty dragon, and the king mourned over his loss day and night, and made it known that whoever brought her back to him should have her for a wife. Then the four brothers said to each other, 'Here is a chance for us; let us try what we can do.' And they agreed to see whether they could not set the princess free. 'I will soon find out where she is, however,' said the star-gazer, as he looked through his glass; and he soon cried out, 'I see her afar off, sitting upon a rock in the sea, and I can spy the dragon close by, guarding her.' Then he went to the king, and asked for a ship for himself and his brothers; and they sailed together over the sea, till they came to the right place. There they found the princess sitting, as the star-gazer had said, on the rock; and the dragon was lying asleep, with his head upon her lap. 'I dare not shoot at him,' said the huntsman, 'for I should kill the beautiful young lady also.' 'Then I will try my skill,' said

the thief, and went and stole her away from under the dragon, so quietly and gently that the beast did not know it, but went on snoring.

Then away they hastened with her full of joy in their boat towards the ship; but soon came the dragon roaring behind them through the air; for he awoke and missed the princess. But when he got over the boat, and wanted to pounce upon them and carry off the princess, the huntsman took up his bow and shot him straight through the heart so that

he fell down dead. They were still not safe; for he was such a great beast that in his fall he upset the boat, and they had to swim in the open sea upon a few planks. So the tailor took his needle, and with a few large stitches put some of the planks together; and he sat down upon these, and sailed about and gathered up all pieces of the boat; and then tacked them together so quickly that the boat was soon ready, and they then reached the ship and got home safe.

When they had brought home the princess to her father, there was great rejoicing; and he said to the four brothers, 'One of you shall marry her, but you must settle amongst yourselves which it is to be.' Then there arose a quarrel between them; and the star-gazer said, 'If I had not found the princess out, all your skill would have been of no use; therefore she ought to be mine.' 'Your seeing her would have been of no use,' said the thief, 'if I had not taken her away from the dragon; therefore she ought to be mine.' 'No, she is mine,' said the huntsman; 'for if I had not killed the dragon, he would, after all, have torn you and the princess into pieces.' 'And if I had not sewn the boat together again,' said the tailor, 'you would all have been drowned, therefore she is mine.' Then the king put in a word, and said, 'Each of you is right; and as all cannot have the young lady, the best way is for neither of you to have her: for the truth is, there is somebody she likes a great deal better. But to make up for your loss, I will give each of you, as a reward for his skill, half a kingdom.' So the brothers agreed that this plan would be much better than either quarrelling or marrying a lady who had no mind to have them. And the king then gave to each half a kingdom, as he had said; and they lived very happily the rest of their days, and took good care of their father; and somebody took better care of the young lady, than to let either the dragon or one of the craftsmen have her again.

#### The Four Clever Brothers Questions

1. Assuming this story is set in 1800, what year will the four brothers reunite?
2. Which brother became the thief?
3. What profession did the third brother study?
4. Which brother repaired the boat, and how did he do so?
5. Which brother did the princess want to marry?

## APPENDIX H

**Demographics**

Please provide all of the following information (*This information will be used for research purposes only*):

1. Age: \_\_\_\_\_
2. Gender: Male\_\_ Female\_\_ Other: \_\_\_\_\_
3. Race/Ethnicity: \_\_\_\_\_
4. Marital Status: Single/Never Married\_\_ In a Relationship\_\_ Married\_\_ Divorced\_\_
5. Education Level: HS Diploma\_\_ Some College\_\_ Associate's Degree\_\_ Bachelor's Degree\_\_
6. Please place an X on each of the lines below to indicate your experience with rurality.

**My childhood home was:**

Rural

Urban

**My current residence is:**

Rural

Urban

## APPENDIX I

*INFORMED CONSENT: Assessing Reactions to Auditory Cues*

## HOLTZMAN LAB

The primary investigator of the current study is Thomas Hutchison, a doctoral candidate in the Clinical Psychology (Psy.D.) program at Georgia Southern University. Jessica J. Brooks, Ph.D., an Assistant Professor at Georgia Southern University, serves as the faculty advisor for this study. This research is being conducted within the Department of Psychology in an effort to advance knowledge in the area of guided imagery.

The purpose of this research is to further understand relationships between the theme of guided imagery and its effects on perceived and physiological stress. This study intends to gather data across these areas of interest in order to determine how these factors might contribute to stress reduction.

This is an exploratory study that seeks to determine whether theme of guided imagery affects stress response. You will complete a series of questionnaires that assess mood and stress, engage in a stress-inducing task, then participate in an exercise designed to reduce stress. The duration of this session is an estimated 30-45 minutes.

Level of risk in participating in this study is minimal. Participation in this study should not elicit more than negligible amounts of psychological discomfort. While some participants may experience an increase in emotional distress by reflecting on recent experiences of low mood or distress, we do not believe this discomfort would be greater than what an individual may experience on an average day. Should distress arise, in the debriefing process you are encouraged to contact the Georgia Southern University's Campus Counseling Center (CCC) at (912) 478-5541 for further assessment and possible treatment of any mental health concerns.

While not a guaranteed benefit, simply participating in this study may temporarily decrease your current level of perceived stress. Through participation in research, you may gain a greater understanding of psychological research with regard to its construction and execution—this is particularly beneficial for those interested in pursuing a career in the field of psychology. On a larger scale, participants in this study are providing data that will lead to advancement of understanding of the role of theme in guided imagery.

Completion will result in **1.5 points** credit. Participation in this study is completely voluntary. You may end your participation in this study at any time by telling the research assistant that you would like to withdraw from the study. You do not have to answer any questions you do not want to answer. Furthermore, there will be no penalty should you decide not to participate in the study. It is your right to discontinue the study at any time and for whatever reason. Should you decide to withdraw from the study, you will be compensated according to the amount of time you committed to the study: <10 minutes = 0 credits; 10 to 25 minutes = 0.5 credit; 30-45 minutes = 1.5 credits.

Statement of Confidentiality: The primary investigator will have full access to all information and is charged with ensuring data, and research documents are housed in a secure location that only the PI can

access. All data and accompanying research documents will be destroyed in 3 years time following completion of this study. The PI's authorized research assistants will have partial and temporary access to data and research documents. All researchers in the Holtzman Lab have completed ethical trainings in research as enforced by the Institutional Review Board at Georgia Southern University. Your information will be confidential. That is, your name or personal information will not be reported with the data.

Participants have the right to ask questions and have those questions answered. If you have questions about this study, please contact the PI whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-0843.

Because the validity of the results could be affected if the purpose of the study is fully divulged to you prior to your participation, it is important that you understand that the purpose of the study cannot be explained to you at this time. You will have the opportunity to receive a complete explanation of the purpose of this study following your participation.

You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H18348.

**Title of Project:** Assessing Reactions to Auditory Cues.

**Principal Investigator:** Thomas Hutchison, M.S., [thomas\\_h\\_hutchison@georgiasouthern.edu](mailto:thomas_h_hutchison@georgiasouthern.edu)

**Faculty Advisor:** Jessica J. Brooks, Ph.D., (912) 478-7929, [jbrooks@georgiasouthern.edu](mailto:jbrooks@georgiasouthern.edu)

\_\_\_\_\_  
[Participant] Signature

\_\_\_\_\_  
Date

I, the undersigned, verify that the above informed consent procedure has been followed.

\_\_\_\_\_  
[Research Assistant] Signature

\_\_\_\_\_  
Date