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Stress of College Students and Memory with the Implementation of Brief Mindfulness

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Walden University
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Abstract

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MS, Capella University, 2008

MA, University of Arkansas Little Rock, 2004

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Psychology

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Abstract

College students are faced with stressors which can negatively impact memory function, thereby, negatively affecting academic performance. This study used a field experiment design to investigate the effects of brief mindfulness on levels of distress and memory functioning between first-year community college students engaging in a brief mindfulness intervention (n = 29) and a control group (n = 28) by using ANCOVA, MANOVA, correlations, and descriptive statistics. Research questions examined whether a brief mindfulness intervention lowered levels of distress in a treatment group. Second, the study examined whether the intervention of brief mindfulness in a treatment group improved memory function. Finally, the findings of this study answered if changes in levels of distress mediated the effects of exposure to mindfulness on memory function. Using the Brief Symptom Inventory, changes pre to postintervention levels of distress were examined. Distress levels decreased in treatment and control groups following 15 minutes of relaxation (MBSR and unstructured). Differences in memory function were examined using the WMS-IV. Positive correlations between the ability to recall visual and verbal materials on a delay in both groups were found. The findings of this study contributed to positive social change by emphasizing the high levels of distress community college students experience. These findings support the importance of implementing brief stress reduction opportunities in a classroom setting, whether structured stress reduction, such as mindfulness based stress reduction (MBSR), or unstructured relaxation-time, as a supportive measure to encourage healthy coping skills in handling stress, thereby improving memory and the projection of improving physical and mental well-being, as well as, educational outcomes.

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Dedication

I would like to dedicate my dissertation to my parents, whose perseverance has served as a continual source of inspiration in my life. Thank you for teaching me to never stop learning. I could not go without also dedicating this work to my remarkable children. Your strong minds and sweet spirits serve as a reminder that although life may come with defeats, we are never defeated. Thank you for your patience, love, and support. Deep breath in. Slow breath out.

Acknowledgement

Thank you, God, for giving me the opportunity for education, as well as, the strength and tenacity to complete this degree. I understand how fortunate I am and do not take that for granted. Without the support of my loved ones, I don't know how I could have ever completed this endeavor. To my children, your understanding and enduring tolerance of my schooling has been beyond what I deserve. I promise the days of me saying, "No, sorry; I have to do my school work," are over; and yes, we can play soccer. I am in awe of the authenticity and inner drive you each have and know you will not just do good things, you will do great things. To my parents and brothers, also known as, my counselors, my coffee companions, Tex-Mex connoisseurs, prayer warriors, and my cheer squad, I am so blessed to be born into a family like ours. Thank you for giving me a love for serving others and instilling in me the ability to keep going forward. To my committee members, acknowledgement and thank you is not enough for all the guidance and support you have bestowed upon me throughout this process. To my chair, Dr. John Astin, your knowledge, expertise, feedback, and support have been invaluable to me. It is not every day a person gets the opportunity to have guidance from one of their professional idols, and I am lucky enough to say I have. To my second committee member, Dr. Peggy Gallaher, thank you for your feedback and support. Your knowledge and proficiency was vital throughout the dissertation process. To Dr. Brian Cesario, the University Research Reviewer, thank you for your expertise to ensure my dissertation complied with the standards of the university and to the research community. Thank you to the institution that sponsored the data collection, without their willingness to participate in the study, there would have been no study.

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Chapter 1: Introduction to the Study

Introduction

In any learning experience, memory functions are the crux of learning. Daily stress can negatively impact cognition and working memory (Rickenbach, Almeida, Seeman, & Lachman, 2014; Vogel & Schwabe, 2016). Stress levels among traditional college students are some of the highest of any other age group (American Psychological Association, 2013; Conley, Travers, & Bryant, 2013; Saleh, Camart & Romo, 2017; Welle & Graf, 2011). Colleges are becoming acutely aware of the impact of stress in the lives of students and how it can interfere with learning processes, matriculation, and overall well-being (Tugend, 2017). Recently, the Duke Endowment (2017) granted over $3 million dollars to four participating universities to study stress factors among college students with the goal of implementing collegiate intervention programs to encourage resiliency among college students, thereby reducing stress levels while improving mental health and educational outcomes.

College students face a variety of daily stressors, such as academic and social pressures, moral pressures and familial expectations, which can leave students at a higher risk of developing mental health issues (e.g., depression and anxiety), decreased immunity function, and other physical health concerns (e.g., headaches) (Baghurst & Kelley, 2014; O'Donovan & Hughes, 2008). It has been shown that students in college often encounter short-term, acute stressors throughout the day (e.g., stress over an upcoming examination, difficulties finding a parking spot, walking into class unprepared for the lecture), which while generally adaptable, can have negative effects on overall

health wellness (e.g., changes in immunity and sleep impairments) and academic success (Beiter et al., 2015; Chang, 2006; Leppink, Odlaug, Lust, Christenson & Grant, 2016; Milojevich & Lukowski, 2016; Rayle & Chung, 2007; Schneiderman, Ironson & Siegel, 2005; Uddin, 2015). In a study regarding the stressors college students face, it was found female students scored higher on levels of perceived stress than their male counterparts (Saleh et al., 2017). This study focused on the impact of learning, specifically memory function, among community college students, when stressors were managed through the brief use of components of mindfulness meditation. Using quick, mindfulness techniques in an educational setting have not been studied regarding not only lowering stress levels, but also measuring memory functions after the immediate implementation of brief mindfulness meditation.

While previous studies have independently asserted that stress is associated with memory problems, as well as shown that stress reduction techniques can reduce stress (Anderson, Birnie, Koblesky, Romig-Martin, & Radley, 2014; Bremner, Shobe, & Kihlstrom, 2000; Chen, Dube, Rice, & Baram, 2008; Hintz, Frazier, & Meredith, 2015; Holzel et al., 2010; Kirschbaum, Wolf, May, Wippich, & Hellhammer, 1996; Yang et al., 2013), no study has integrated all of these variables to assess the relationship between stress and memory in an academic setting. Furthermore, short interventions are needed in education where long, multi-week offerings are usually not feasible. The current study determined the effectiveness of employing 15 minutes of brief mindfulness meditation, using diaphragmatic breathing and sitting meditation on memory recall, among community college students immediately prior to learning new material.

Background

Stress is a part of everyday life (Marks, Murray, Evans, & Estacio, 2008). College students experience inordinate levels of stress (Conley et al., 2013; Welle & Graf, 2011) that can interfere with memory functions (Nauret, 2008; Rickenbach et al., 2014). Therefore, it can be postulated that high levels of perceived distress can negatively impact academic success since memory functions are vital to the learning processes. Previous literature has investigated variables, such as memory and stress; stress and educational outcomes; stress and mindfulness based stress reduction (MBSR) (Anderson et al., 2014; Bremner et al., 2000; Chen et al., 2008; Holzel et al., 2010; Kirschbaum et al., 1996; Leppink et al., 2016; Ramler, Tennison, Lynch, & Murphy, 2016; Vogel & Schwabe, 2016; Yang et al., 2013), no study examined the effects of stress, memory, and educational outcomes by measuring memory functioning. Additionally, no previous research was found regarding the implementation of brief mindfulness meditation to address the interconnectedness of these key components: stress, memory, and educational outcomes.

To advocate for the mental health and well-being of college students and potentially reduce rates of attrition, acknowledging the levels of distress students face is vital. Universities and colleges can implement in-class brief mindfulness meditation to provide tools to encourage stress management in the classroom, thereby potentially lowering levels of acute distress and consequently improving memory retrieval. Since stress has been recognized as an established part of life and stress has been found to negatively impact memory processes (Nauret, 2008), these findings support the need to

examine using an in-class, brief mindfulness-based meditation to investigate the effects of acute stressors on learning.

Problem Statement

College students are confronted with multiple stressors including academics, financial costs, increased independence and autonomy, social demands, and goal setting for the future (Baghurst & Kelley, 2014; Bamuhair et al., 2015). It has been shown students in college often encounter short-term, acute distress throughout the day (i.e., distress over an upcoming examination, difficulties finding a parking spot, walking into class unprepared for the lecture, etc.), which while generally adaptable can also have negative effects on overall health wellness (e.g., changes in immunity) and academic success (Chang, 2006; Lin & Huang, 2014; Rayle & Chung, 2007; Schneiderman et al., 2005; Shankar & Park, 2016). Distress, which is considered negative stress, can yield consequences to college students, including academic performance (Lin & Huang, 2014; Shankar & Park, 2016). Well-developed memory functioning is key to positive educational outcomes and researchers have found stress negatively affects memory recall (Dolcos, LaBar, & Cabeza, 2005; LeBlanc, 2009; Nauret, 2008; Vogel & Schwabe, 2016; Shi & Liu, 2016). Acknowledging the effects of distress on educational outcomes is vital to support college students as they pursue educational goals.

Kabat-Zinn (2013), the founder of MBSR, asserted that the initial step in effectively coping with stressors is to first consciously recognize stress, thereby enabling one to develop ways of more effectively dealing with "change *in general*, with problems *in general*, [and] with pressures *in general*" (p. 291). It is this mindful awareness of stress

that allows an individual greater freedom and flexibility as far as choosing how to cope with the stressor based on the association between the individual and his/her environment, that is, the coping resources available to the individual in their environment (Folkman & Lazarus, 1987). Particularly since some stressors cannot be avoided, it is important that individuals learn ways to effectively cope with stress. Interventions, such as MBSR have been noted to reduce stress (Baghurst and Kelley, 2014; Holzel et al., 2010; Mrazek, Franklin, Phillips, Baird, & Schooler, 2013; Oman, Shapiro, Thoresen, Plante, & Flinders, 2008). Stress reduction in an educational setting can lower stress levels among students (D'Abundo, Sidman, & Fiala, 2016; LeBlanc, 2016). In this study, I sought to examine the effectiveness of brief mindfulness-based meditation on levels of distress and memory outcomes among community college students.

To date, there has been no study that has examined distress, in-class brief mindfulness-based meditation, and memory functioning. Studies suggest that many college students experience significant levels of stress (American Psychological Association, 2013; Conley et al., 2013; Saleh et al., 2017; Tugend, 2017; Welle & Graf, 2011). Roberts et al. (2011) asserted effective memory function was vital to learning processes and ultimately, academic success. Beiter et al. (2015), Lin & Huang (2014), and Shankar & Park (2016) found stress impedes academic success. Therefore, fostering brief, in-class stress reduction can work to lower levels of distress and increase memory function, which in turn may improve academic performance.

Purpose of the Study

This quantitative study examined if brief mindfulness (independent variable) affected levels of distress (dependent variable) among first-year community college students. Secondly, the study explored whether using brief mindfulness techniques affected the dependent variable of memory functions. Next, levels of distress before and after mindfulness exposure were examined to determine if changes in levels of distress were associated with improvements in memory function.

Research Questions and Hypotheses

This study addressed three research questions:

Research Question (RQ) 1. Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) lower levels of distress in a treatment group?

$H_0$1. Exposure to a brief mindfulness intervention has no effect on levels of distress among the treatment group when compared to no treatment controls.

H_a1. Exposure to a brief mindfulness intervention lowers levels of distress among the treatment group when compared to no treatment controls.

RQ2. Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) improve memory function in a treatment group?

$H_0$2. Exposure to a brief mindfulness intervention has no effect on memory function among the treatment group when compared to no treatment controls.

H_a2. Exposure to a brief mindfulness intervention improves memory function among the treatment group when compared to no treatment controls.

RQ3. Do changes in levels of distress mediate the effects of exposure to mindfulness on memory function?

$H_0$3. Changes in levels of distress do not mediate the effects of exposure to mindfulness on memory.

H_a3. Changes in levels of distress mediate the effects of the exposure to mindfulness on memory.

These research questions were addressed using secondary data consisting of scores on the Brief Symptom Inventory (BSI), using 4 dimensions: anxiety (ANX), somatization (SOM), obsessive-compulsive (O-C), and depression (DEP) (pre and posttest), which measured levels of distress and scores on the Wechsler Memory Scale-IV (WMS-IV), which measured memory functioning collected from first-year college students at a 2-year college located in the Houston, Texas metropolitan area. These findings were compared between a treatment group exposed to brief mindfulness interventions and a group of students not exposed to the intervention.

Theoretical Framework

This study relied on the theoretical frameworks of the cognitive activation theory of stress (CATS) (Reme, Eriksen, & Ursin, 2008) and Baddeley and Hitch's theory of working memory (Baddeley & Hitch, 1974). CATS focuses on learning expectations as they relate to coping with stressors. Reme et al. postulated the ways individuals cope with stress depends on expectancies which are either acquisition strength, discerning through learning if an event is threatening, perceived probability (the individual's perception of control over a predicted stressor), or the affective value of the stressor. The affective

value refers to whether the stressor will motivate the individual through attractiveness of what the outcome of the stressor may be, dissuade the individual to engage in the stressor through aversion, or not provide motivation either way, as a neutral outcome. There are three possible outcomes to stress: (a) coping expectancy (an individual has the ability to change the stress or even the perception of stress); (b) helplessness expectancy (an individual's actions have no effect on the stressor); or (c) hopelessness expectancy (actions to thwart the stressor have negative consequences.

While CATS focused on the perception of stress, Baddeley and Hitch's (1974) theory of working memory provided the framework to examine memory functions. Baddeley and Hitch contended new information, such as a college lecture, first go through short-term memory. If the information was deciphered as relevant and the individual was attentive enough to determine its relevancy, then the information was encoded. Encoding is necessary in order to file information correctly in long-term storage for later retrieval (i.e., recalling lecture information for an exam). Previous research concluded attentional load effects of memory interfered with encoding and retrieval of information when the attention of individuals was foiled by other tasks, causing a shift in attention, thereby impairing memories (Allen, Hitch, Mate, & Baddeley, 2012). This theoretical model was used in this study to investigate the effects of stress on memory functions using the WMS-IV.

Nature of the Study

I examined secondary data collected from a convenience sample of first-year college students at a 2-year community college in the Houston metropolitan area.

Students were randomly assigned to a control group that did not receive mindfulness meditation or to a treatment group that did receive mindfulness meditation. Levels of perceived distress were measured using the BSI (dependent variable), and memory function using the WMS-IV (dependent variable). Analysis of covariance, multivariate analysis of variance, correlations, and descriptive statistics were used to test whether engagement in the brief mindfulness intervention (independent variable) positively impacted stress and memory function and whether changes in perceived distress mediated the effects of the intervention on memory.

Definitions

The terms defined below are key terms, which were used throughout the study.

Brief mindfulness meditation: Brief mindfulness meditation consisted of diaphragmatic breathing and sitting meditation, which are two components of MBSR (Kabat-Zinn, 2014).

Diaphragmatic breathing: Diaphragmatic breathing is a breathing technique in which an individual intentionally relaxes the abdomen when breathing. As the breath enters the diaphragm, the abdomen slightly expands. This breathing technique allows individuals to slow down breathing while intentionally taking deeper breaths, which expand the diaphragm, lessening the tendency to breathe from the chest area (Kabat-Zinn, 2014).

Gender: Gender is defined as male or female, as participants self-identified on a demographic sheet.

Mindfulness: Mindfulness is when an individual consciously self-regulates attention, with nonjudgmental awareness, while accepting internal and external realities, and letting go (Erogul, Singer, McIntyre, & Stefanov, 2014; Kabat-Zinn, 2013).

Mindfulness-Based Stress Reduction (MBSR): Mindfulness-based stress reduction is comprised of formal and informal mindfulness meditation. Formal methods include gentle Hatha yoga, sitting meditation, and walking meditation. Informal methods include: awareness of events, awareness of breathing, intentional awareness of routines and happenings (Kabat-Zinn, 2014).

Sitting meditation: Kabat-Zinn (2014) explained the process of sitting meditation as follows: Sitting meditation consists of sitting in a chair with both feet flat on the floor. The individual's back will not rest on the back of the chair, instead the individual will sit erect and allow the spine to support the back, with the head, neck, and back vertically aligned. While sitting in this posture, the individual will be attentive to breathing, feeling the air coming in and out (using the diaphragmatic breathing technique). Sitting meditation, while aware of breathing, the individual will be mindful in the present, each breath at a time.

Stress: Lazarus and Folkman (1987) defined stress as the relationship between the person variables and the environmental variables, as appraised by the individual as being either greater than his/her perceived coping resources and/or endangering immediate and/or long-term well-being, which causes stress (Butler, 1993). Distress and stress were used interchangeably throughout literature (McKenzie & Harris, 2013).

Assumptions

The testing instruments used in the study, the BSI and WMS-IV, have been assessed for reliability and validity and are considered professionally sound testing instruments to adequately assess for levels of perceived distress and memory function. These instruments have been assessed for construct validity, test-retest reliability, and generate high levels of internal consistency; therefore, it was assumed test results yield an accurate representation of participants' current state of stress and memory abilities (Cassady & Dacanay, 2012; Chittooran, 2012; DeRogatis, 1993). It was assumed (di)stress is a complex process of both external and internal factors, which can affect physiological processes (American Psychological Association, 2018; McKenzie & Harris, 2013). It was assumed stress can also affect neurological function (McEwen, 2007; Osborne, Pearson-Leary, & McNay, 2015; Wolf, May, Wippich, & Hellhammer, 1996). Overall, stress levels are assumed to be high among college students (American Psychological Association, 2013; Conley et al., 2013; Ramler et al., 2016; Saleh et al., 2017).

Scope and Delimitations

The intent of this study was to investigate the usefulness of brief stress interventions in a college classroom to reduce levels of perceived distress and the effect on memory function. The respondents of the study composed of 57 first-year community college students from a convenience sample. Community college students were considered for this study since this population tends to cope with additional stressors (such as providing for a family or representing the first in a generational line to press

towards a degree) when compared to students enrolled in 4-year institutions (American Psychological Association, 2013; Conley et al., 2013; Inceptia, 2013; Tugend, 2017; Welle & Graf, 2011; Zeidenberg, 2008). First-year community college students were studied as they have academic stressors with learning experiences, and other contributing stressors, such as adjusting to new responsibilities and expectations as first-year college students.

Students in the Houston metropolitan area were selected from a 2-year community college as part of a collaborative institutional interest in the possible implementation of stress reduction strategies among enrolled college students. The community college site reflected a diverse population and its size provided relative ease of data collection. The Houston area was recently touted as the "most diverse place in America," by the LA Times (Mejia, 2017).

The focus of the study was on first-year community college students. Stress levels were presumed to be highest among incoming freshmen, as they adapt to the transition of college (Saleh et al., 2017). Therefore, students who have previously attended as first-year students were not included in the recruitment.

The study used the theoretical basis from CATS and Baddeley and Hitch's theory of working memory. Student participants' levels of perceived distress were self-rated, along with how memory functions may or may not improve if brief mindfulness meditation was introduced. When brief mindfulness meditation was introduced to the treatment group, a posttest BSI revealed if levels of distress changed following the intervention.

Other theoretical frameworks, such as the cognitive load theory, were not used in this study. While cognitive load theory does incorporate concepts of working memory and how extraneous factors can interfere with learning processes, the emphasis of learning context-dependence, that is the environment in which learning takes place, was not applicable to the current study (see Hazan-Liran & Miller, 2017; Leppink, 2017). In the current study, the learning environment was not in question, rather the levels of perceived distress individual students bring into the classroom were potential barriers to effective memory function. The goal of this study was to provide additional insight into the stress-memory connection, but also provide practical suggestions for incorporating brief mindfulness meditation in a classroom setting to improve memory function, thereby improving educational outcomes.

College students were chosen for this study, as college students have been found to be one of the highest stressed population groups (American Psychological Association, 2013; Conley et al., 2013; Tugend, 2017; Welle & Graf, 2011). First-year college students at a community college were specifically targeted for this study. As Zeidenberg (2008) noted, community college students compose half of all college students in the United States. In order to have academic levels commensurate with college level courses, community college students contend with higher rates of remediation course work than their 4-year university counterparts. Additionally, according to Zeidenberg (2008), community college students tend to have lower degree completion rates when compared to students enrolled in a 4-year institution and are most often first-generation college students with limited knowledge of resources to aid in college success. Inceptia (2013)

surveyed first-year college students around the United States and discovered almost one in five community college students are stressed about finances, while only 7 % of students enrolled in 4-year institutions feel financial stress. This survey also found students in community colleges work, on average, more hours per week when compared to their 4-year university counterparts. A greater number of community college students surveyed had the additional stressors of providing for a family when compared to students enrolled in a 4-year institution (Inceptia, 2013). While college students are stressed, it appears students attending community college cope with additional stressors deeming them an appropriate research group to study stress and memory function and the potential of mindfulness to beneficially affect these (American Psychological Association, 2013; Conley et al., 2013; Inceptia, 2013; Tugend, 2017; Welle & Graf, 2011; Zeidenberg, 2008).

Limitations

The participant sample of this study introduced some potential limitations. According to the U.S. Department of Education's National Center for Education Statistics (2017), the percentage of individuals enrolling in college in 2017 has quadrupled since 2000, indicating many Americans are now attending college. However, it was still important to consider that findings from a sample of first-year college students at a 2-year community college in the Houston metropolitan area, may not accurately represent the memory abilities or stress levels found in a general, nonstudent population. While the Houston region is diverse, the represented students in the community college

selected for this study may not represent life stressors college students in other cities, states, or countries face.

To address the potential limitations of representation, these were noted and recommendations for further research were provided in order to expand the study to college students in community colleges and universities in other geographical areas, as well as, other walks of life, including, but not limited to data collection at locations such as, work sites, homeless shelters, community event centers, and churches, in order to reach a more varied demographic.

While not every first-year college student is at least 18 year of age, in order to protect vulnerable populations and eliminate the need for third party (parental/guardian) consent, only individuals at least 18 years old were included as participants in this study. The sample did not include continuing year students and therefore, the results may not generalize to students who have been in college for at least a year and whose levels of distress may have adapted to demands.

Another potential limitation was the use of the quantitative design, which did not allow participants to provide additional information or explanations on items such as the BSI. In a qualitative study, the researcher could ask broad questions allowing a participant to further explain their thoughts and experiences regarding their levels of perceived distress. However, in a quantitative study with close-ended questions and statements, the outcomes were limited to the particular questionnaire items and associated constructs it assessed.

Additionally, participants' premorbid psychiatric disorders and/or medical health disorders that may exacerbate levels of distress were not be disclosed by the participants at any time during data collection due to the potential of personal intrusion. While knowing participants' premorbid conditions may be helpful in understanding the data collected, it was not necessary for the intent of this study and viewed as overly intrusive.

The WMS-IV is a testing instrument that cannot be given to individuals with severe visual impairments due to visual reproduction or to individuals with limited fine motor skills due to visual reproduction. If a participant had a significant visual impairment, hearing impairment, and/or fine motor impairment, it was noted by self-disclosure on the demographic sheet. If a participant disclosed a significant visual or fine motor skill impairment, the individual's results from the visual reproduction subtests were discarded and only verbal subtest scores were used for that person's data analysis; in cases where the participant identified as having a significant hearing impairment, the data on their verbal subtests was discarded. In the future, an alternative verbal and/or visual memory scale may be implemented for individuals with hearing impairments, visual impairments, and/or individuals with fine motor impairments to ensure equal participation in the study.

In this study, specific elements of mindfulness intervention, levels of perceived distress, and memory function in college students were examined. While other phenomena intersected with the current research interests of memory function and stress in college students, in order to narrow the research focus, other phenomena, such as the interaction of sleep deprivation on memory processes (Patrick et al., 2017), sleep

deprivation on levels of stress (Hershner & Chervin, 2014) and the effects of memory function in college students when attentional disorders and/or learning disorders were present (Gropper, Gotlieb, Kronitz, &Tannock, 2014) were not examined or included as variables for the purposes of this research study. Limiting the factors of examined phenomena to the stress of first-year community college students, memory, and mindfulness interventions, allowed the concentration of research to these areas, thereby ensuring a thorough understanding and expertise by the researcher in fields pertinent to this study.

Significance

Considering the breadth of research which indicated high levels of distress had a negative association with memory functioning, combating stress levels would be important to improve memory functions and educational outcomes (Baumeister, Campbell, Krueger, & Vohs, 2003; Vaez & LaFlamme, 2008). Although higher numbers of individuals are enrolling in colleges and universities, rates of attrition are high, with only 33% of United States adults obtaining a bachelor's degree (Ryan & Bauman, 2016). From a societal standpoint, more college graduates mean greater earning power, and greater contribution to fields and economic growth (Raniseski, 2014). In addition to improving educational outcomes, the effects of mindfulness meditation techniques were found to improve physical health, as well as emotional well-being (Gross et al., 2009). Reflecting on high percentages of stress among college students, including high incidence of depression and anxiety (Pierceall & Keim, 2007), through the incorporation of mindfulness meditation as a way of life on a college campus, the development of lifelong

coping skills among college students may benefit in effectively managing stress. This study contributed to positive social change by indicating the importance of stress reduction in college classrooms to improve memory functions.

Summary

College students experience high rates of distress (Conley et al., 2013; Welle & Graf, 2011), putting them at risk for a host of physical ailments, emotional exhaustion, and consequently, poorer memory abilities (Nauret, 2008; Rickenbach et al., 2014). Since distress negatively affects memory (see Nauret, 2008), and memory is one of the foundations of learning (see Arsenio & Loria, 2014; Vaez & LaFlamme, 2008), then it can be postulated that distress may negatively affect memory for some individuals. Through the use of brief, in-class techniques, via diaphragmatic breathing and sitting meditation, to determine if there was a reduction in levels of perceived distress and differences in memory functions from participants that used diaphragmatic breathing and sitting meditation and those participants that did not. This study examined this possibility. The literature review provided evidence of the stress-memory connection, as well as efficacy of mindfulness-based meditation techniques to reduce distress levels. The methodology chapter highlighted the theoretical basis of research using the CAT and Baddeley and Hitch's theory of working memory, as well as the structure of the experiment and data collection from students at a 2-year community college in the Houston metropolitan area. Chapter 4 provides a thorough explanation of the data collection process, data analysis from the collected secondary data, and answered the

research questions. Chapter 5 discusses the study findings, their implications considering previous research, and provided recommendations for future research.

Chapter 2: Literature Review

Introduction to Literature

The purpose of this study was to determine if a brief mindfulness meditation intervention, consisting of diaphragmatic breathing and sitting meditation (two components of MBSR), increased memory retention and recall by reducing levels of distress in a college classroom setting.

A thorough review of existing literature was conducted using the Walden University Library databases, including Thoreau Multiple Database Search, ScholarWorks, PubMed, ERIC Database, Education Source, Directory of Open Access Journal, Journals@OVID, EBSCOhost, as well as Google Scholar. A variety of key terms were used to find relevant research in search engines: *stress; stress* and *memory function; stress* and *MBSR; stress* and *meditation; stress reduction; stress* and *college students; distress; stress; acute stress; Wechsler Memory Scale;* and *Brief Symptom Inventory*.

The stress-memory connection was established in a variety of previously reviewed studies. Heightened levels of stress negatively impacted memory retention and adequate recall (Nauret, 2008; Rickenbach, Almeida, Seeman, & Lachman, 2014). Since Nauret (2008) contended stress strains memory functions, stressed students will likely have greater difficulties processing and encoding newly learned material for later retrieval, than their nonstressed counterparts. These findings supported the need to examine if an in-class stress reduction technique could mitigate the effects of stressors on learning. While previous studies investigated variables such as memory and stress; stress and educational outcomes; stress and MBSR (American Psychological Association, 2018;

Anderson et al., 2014; Bamber & Schneider, 2016; Bamuhair et al., 2015; Bremner et al., 2000; Chen et al., 2008; Holzel et al., 2010; Kirschbaum, Wolf, May, Wippich, & Hellhammer, 1996; Leppink et al., 2016; Lin & Huang, 2014; Osborne et al., 2015; Saleh et al., 2017; Shankar & Park, 2016; Yang et al., 2013), no study examined the tridirectional effects of distress, memory, and educational outcomes. Additionally, no research was found regarding the implementation of brief stress reduction techniques to address these three components: distress, memory, and educational outcomes.

Stress

In those times of striving to do the best and falling short, for whatever the reason, those times can be stressful. "Some days, doing 'the best we can' may still fall short of what we would like to be able to do, but life isn't perfect on any front-and doing what we can with what we have is the most we should expect of ourselves or anyone else" (Rogers, 2003, p. 14). Seyle (1956) described stress as anything, which imposed a threat to the homeostasis (the norm) of an individual's life, either negatively, positively, or neutrally. Folkman and Lazarus (1987) contended that stress was based on the association between the individual and the perceived internal and external variables/coping resources available to them. For example, *person variables* were the individual's values, beliefs, commitments, and goals. The *environmental variables* were the demands, resources, constraints, and frequency and was the association between these two types of variables and the individual's ability to cope (or not cope) within their environment that lead to stress (Folkman & Lazarus, 1987, p. 144). Stress can be caused by multiple factors, such as a move to a new school, a job promotion, the death of a loved one, a fight with a

friend, worries over finances, trying unsuccessfully to find a parking place, being stuck in traffic or feeling there is insufficient time to meet demands.

No one is immune to experiencing stress and college students were no exception. In fact, millennials, individuals aged 18 to 33 years old, were reported to be the most stressed of any age group (American Psychological Association, 2013). Saleh et al. (2017) studied French college students, aged 18 to 24, and found almost two thirds of the 483 students studied were suffering from psychological distress, including depressive symptoms and anxious features. Among those participants, researchers found women participants had higher rates of perceived stress and sense of helplessness, lowered rate of self-efficacy, and more psychological distress, including insomnia and somatic complaints. Beiter et al. (2015) examined mental health services provided at a private college in Ohio, which indicated an increase in mental health services by 231% over a 4-year period. Through studies such as these, the high rates of stress levels in college students are apparent.

Stress can manifest in a variety of ways, including physiological reactions, psychiatric disorders, and academic performance (Leppink et al., 2016). A study by Welle and Graf (2011) found college students encounter some of the most stressful times an individual has throughout life. This study also found that students transitioning directly from high school to college experienced the most distress. Leppink et al. (2016) studied 1,885 college students and found severe perceived stress was associated with poorer academic performance, higher rates of psychiatric symptoms, and declines in physical health. Common college stressors were noted as increased academic workload, faster

pace of required learning, increased independence, decreased supervision, pressure to make new friends, finances, and the quest for finding purpose (Welle & Graf, 2011). Conley et al. (2013) echoed these findings, asserting college students, with a median age of 18, experience high levels of stress. A study by Milojevich and Lukowski (2016) discovered poor sleep quality was reported among studied undergraduates who reported they were otherwise healthy sleepers, prior to college. These participants also reported increased internalization of problems and higher rates of externalizing behaviors than they had experienced prior to college.

Stress has been determined as pervasive in society and, as Marks et al. (2008) contended, it "has become a major feature of modern living" (p. 269). Since everyone has a unique, personal threshold for stress, levels of distress affect individuals in differing ways. Selye (1956) posited that stress was a response to stimuli and individuals developed physiological patterns as a result of experiencing the stressor called general adaptation syndrome. The physical reaction to distress is a complex mechanism, which follows a predictive physiological response (Laureate Education, Inc., 2012).

Stress has been viewed as a holistic experience and began physiologically (Laureate Education, Inc., 2012). According to Laureate Education, Inc. (2012), the body is considered the first to respond to stress before the emotions, which then begins the cascade of responses. The first reaction is the quick decision of either *fight* or *flight* in response to the stressor. This response of the autonomic nervous system involves the parasympathetic and sympathetic nervous systems. The limbic system first is signaled by the threat of the stressor (Dalgleish, 2004). Corticotropin and arginine vasopressin are

then released which alerted the individual of the stressor and began the domino effect of the physiological reactions to the stressor, while adrenocorticotropic hormone (ACTH) and thyrotropic are stimulated through the pituitary gland and deposited into the blood stream (Laureate Education, Inc., 2012). Additionally, heart rate increases, along with oxygen levels and respiration rates. Senses become hypervigilant, pupils dilated, peripheral vision acuity increases as the body prepared for the threat. The vessels began vasoconstriction, while the digestive system slows, blood pressure increases, perspiration increases to help stabilize the potential of overheating, and the number of platelets in the blood increases. In other efforts to conserve energy and resources, immune system function decreases and thyroxine was released into the blood stream, which increased metabolism, energy consumption, and increased physical responsiveness. The adrenal gland releases cortisol, epinephrine, and norepinephrine into the body. As a result, the liver converts glycogen into glucose, which provides additional energy for the body to fight the threat. Fats and proteins are also released which provides the body with adequate resources to respond to the stressor. The release of adrenaline quickly accelerates throughout the body as an additional resource to respond to the stress. The hypothalamic-pituitary-adrenal axis (HPA) regulates the hormonal response to stress, which can last for days after experiencing the threat, even transient threats (Laureate Education, Inc., 2012).

College students tend to experience high rates of stress and research indicated these high levels of distress dispose this population to possible mental health problems as well, such as anxiety and depression, substance abuse, physical ailments (i.e.,

gastrointestinal), other addictive behaviors, in addition to inattention (American College Health Association, 2011; Compas, Connor-Smith, Saltzman, Thomsen & Wadsworth, 2001; Conley et al., 2013; Marin et al., 2011; Watson & Pennebaker, 1989). Once stress is introduced, it could take the form of feelings of nervousness, feeling tense and on edge, feelings of panic, increased irritability, inattentiveness, feelings of sadness, being overly forgetful, and at its most extreme, self-injurious or suicidal. Suicide has been affirmed as the second leading cause of death among college students (Novotney, 2014). While stress was not considered a mental health disorder, it is identified as a contributor to affective concerns, such as depressive symptoms and anxiety. With nearly one in every two college students who have endorsed symptoms of depression, the comorbidity with heightened levels of perceived stress cannot be overlooked (Welle & Graf, 2011). Additionally, according to Novotney (2014), almost half of college students experienced overwhelming anxious features. Rising numbers of mental health concerns among college students, including increased incidence of suicide attempts, increased rates of depression and anxiety, and increased levels of perceived stress, all indicated college students are a population in need of effective intervention strategies to cope with distress (see Novotney, 2014; Welle & Graf, 2011). Stress effects more than the emotional state of a person, further jeopardizing the homeostasis of individuals by effecting physical processes (Mokdad, Marks, Stroup, & Gerberding, 2004). Female students described stress as something that entailed physical and emotional consequences, while most male students described stress primarily in terms of its physical manifestations (Chandra & Batada, 2006). Stress influences the well-being of college students on a broad spectrum,

by impacting mental and physical health (see Chandra & Batada, 2006; Mokdad, Marks, Stroup, & Gerberding, 2004; Novotney, 2014; Welle & Graf, 2011).

Providing college students strategies for stress management was considered an integral part of teaching effective coping strategies in handling the inevitable stressors they face throughout life. Compas et al. (2001) supported this assertion by explaining the stressors older adolescents encountered and how they handle those stressors, influenced the way they handled stress throughout their lifespan if new methods were not introduced. This argument further underscored the importance of teaching effective stress management techniques to college students.

While much research on college students primarily focused on traditional students in the millennial generation, the age demographic at many colleges shifted to include larger numbers of non-traditional students. As Gardner and Barefoot (2012) acknowledged, adult (nontraditional) students returning to college or attending college for the first time, encountered additional stressors when compared to traditional students. "Adult students often experienced a daunting lack of freedom because of many important conflicting responsibilities" (p. 12). Adult students often had full-time jobs, families to care for, and other roles that they had to fill while the new role of student fell into place amidst the existing roles. These adult learners comprised at least 50% of the enrollment among colleges and universities (Miller Brown, 2002) and were a demographic that should not be ignored.

Mindfulness

Mindfulness could be described as deliberate, self-regulated attention, nonjudgmental awareness, the acceptance of both internal and external realities, and letting go (Erogul et al., 2014; Kabat-Zinn, 2013). Kabat-Zinn (2013) designated "moments of mindfulness" as "moments of peace and stillness, even in the midst of activity…It is the only human endeavor I know of that does not involve trying to get somewhere else, but rather, emphasizes being where you already are" (p. 55). The foundational practices of mindfulness are organized in Table 1 and provide descriptions of each tenant.

Table 1

Mindfulness Practice: Attitudinal Foundation

Foundation	Description
Non-Judging	a) Become aware of automatic judgments b) Pay attention to the mind (i.e., what is labeled as good, bad, and neutral)
Patience	a) Foster patience within the mind and body when practicing mindfulness b) Moments do not have to be filled with activity or more thinking c) Be open to each moment, accept it, and know it
Beginner's Mind	a) The willingness to see even the ordinary as extraordinary b) Viewing things as if it is for the first time without the history of personal thoughts, emotions, or opinions
Trust	a) Trust self and instinct
Non-striving	a) Meditation is non-doing b) The goal is authenticity of self c) Pay attention to what is authentically happening (i.e., if you feel tense, be mindful of the tension) d) Be in the present
Acceptance	a) Willingness to see things are they are in the moment b) "Healing is coming to terms with things as they are" (p. 27)
Letting Go	a) Purposefully stop the tendency to ruminate on some aspects of experiences and reject others b) Let the current experience be what it is c) Observe the present, moment to moment d) Let go of the impulse to judge experiences, feelings and thoughts

Note. Seven-attitudinal foundations of mindfulness practice and descriptions found in Kabat-Zinn (2013).

In 1979, Kabat-Zinn (2013) founded the MBSR program through the Stress Reduction Clinic at the University of Massachusetts Medical Center. In this context, mindfulness was introduced, sans cultural and religious tenants but as a secular form of meditation. MBSR included both formal and informal methods of mindfulness. Formal methods included body scan, gentle Hatha yoga, sitting meditation, and walking meditation. Informal methods of include awareness of events, awareness of breathing, intentional awareness of routines and happenings (Kabat-Zinn, 2014). To date, over 20,000 individuals have participated in the 8-week course at the Stress Reduction Clinic. Mindfulness programs have spread throughout the world with 720 programs based on MBSR incorporated in medical treatment, such as hospital and clinic settings, adding to the field of behavioral and integrative medicine (Kabat-Zinn, 2013). While the incorporation of mindfulness in various health care settings continued to be studied quite extensively (Tacon, 2003; Lamkin & Slavich, 2014; Morgan, Simpson, & Smith, 2015), research on the inclusion of such programs in educational settings was more limited (Shapiro, Brown, Astin, 2008; Schonert-Reichl et al., 2015).

Rosenzweig, Reiel, Greeson, Brainard, and Hojat (2003), over 4 years, studied the moods of second year medical students who participated in a 90 minute, 10-session, weekly seminar MBSR course. These students were also instructed to participate in 20 minutes of formal meditation, 6 days a week with the use of an audio cassette provided to them for guidance. In the seminar sessions, students were instructed on body scan, breath awareness, mindful stretching, sitting meditation, walking meditation, and guided imagery. At the conclusion of the course, 88% of participants felt mindfulness practice

was helpful or very helpful. Over half of the participants reported increased capacity to cope effectively with stressors following the intervention. Almost all the participants (98%) reported they would recommend MBSR programs to other medical students and would refer their patients to such programs. The study presented by Rosenzweig et al. (2003), supports the use of MBSR as a way to lower stress levels.

A study of medical students with the incorporation of mindfulness within the curriculum was conducted on first-year students (Erogul et al., 2014). Participants attended an 8-week MBSR program, which lasted 150 minutes, once a week and daily, at-home meditation for 40 minutes. Participants were instructed on body scan, breath meditation, and breathing-based yoga. Students reported a reduction of perceived stress (pre to posttreatment) and increased rates of self-compassion. At 6 months, post-treatment rates of self-compassion continued to be higher than the participants' pretreatment scores, but levels of perceived stress did not show improvement 6 months after the intervention. Additionally, factors of resiliency were tested pre and post-reatment and did not demonstrate significant changes. Erogul et al. (2014) found the implementation of MBSR temporarily decreased levels of distress among medical students, but the benefit of lowered perceived stress levels did not persist past 6 months posttreatment.

Another study included students enrolled in second and third semester clinical psychology and medical programs, and sought to determine the efficacy of mindfulness training as a means to improve coping skills (Halland et al., 2015). This study included 90-minute-sessions of mindfulness training, once a week, for six weeks; with 30 minutes

of daily, at home practice. While the study did not indicate the specific mindfulness techniques that were practiced, it was indicated this was a formal training program at the University of Oslo and University of Tromso in Norway. The Ways of Coping Checklist and Basic Character Inventory were used pre and postintervention. Compared with controls, participants in the treatment group were found to have better problem-focusing coping skills, postintervention and improved problem-focused coping skills. It was determined mindfulness training helped participants transform stressful events into more manageable challenges, post-treatment. This study did not explore educational or academic outcomes as a result of mindfulness, but was able to provide evidence of increased problem-focused coping, among participants practicing mindfulness, when faced with stressors.

Examination of other studies found the impact of MBSR on relaxation and levels of distress. Aherne et al. (2016) indicated the usefulness of MBSR for increasing satisfaction levels in medical students, but this study did not examine the impact of memory function. Another recent study by LeBlanc (2016) studied the effects of acute stress on medical students, but the recommended treatment measure for coping with stressors was the cognitive behavioral approach of stress inoculation training, not mindfulness-based methods of relaxation. A study of 225 university students found a mindfulness stress management unit taught within a semester, including application activities, lowered levels of stress among student participants. As a result of this study, recommendations were made to educate students on mindfulness-based programs, in which students learn stress management techniques (D'Abundo et al., 2016). Sibinga et

al. (2011) also examined the usefulness of MBSR techniques when studying levels of stress, including school performance and interpersonal relations of a small sample of youth with HIV and youth at-risk for contracting HIV. This study also provided support to the efficacy of MBSR techniques as a means to reduce overall distress, which could be generalized to college students in the current research study.

A study of fourth and fifth grade students detailed the implementation of a teacher- led 12-week program, which taught the tenants of mindfulness and guided students in focused deep breathing and attentive listening for 3 minutes, each school day, three times a day, throughout the duration of the 12-week program. Following the conclusion of the study, students who participated in the mindfulness program demonstrated significant improvements over their control counterparts on tests of executive functioning, better math performance, improved measured of well-being, and higher levels of pro-social behaviors (self-reported and peer-reported) (Schonert-Reichl et al., 2015). While this study did not specifically test memory functioning in the students, it did measure executive functioning performance, which is key to memory. Levels of stress, via the hormone cortisol through salivary collections, were tested, but these findings were inconclusive when comparing levels of cortisol between the control and treatment groups. Schonert-Reichl et al.'s (2015) study demonstrated promise in the incorporation of mindfulness in elementary education, which has the potential to show similar success among individuals in a college setting. Research published in 2017 detailed a small pilot study of graduate and undergraduate college students who participated in brief mindfulness interventions in a healthcare curriculum (Schwind et

al.). These students participated in instructor-led activities consisting of 5 minutes of mindful breathing at the beginning on their weekly class and 5 minutes of lovingkindness meditation at the end of the class. These students were also instructed to practice at home, 4 to 5 times a week, of 5 to 15 minutes of mindful breathing. At the end of the twelve-week term, although most students did not follow through with the at-home exercises, students reported increased levels of empathy, increased compassion, increased reflexivity, increased thoughts of kindness, and reported feeling more relaxed, with lower levels of perceived stress and anxiety, from the 10 minutes of in-class mindfulness practice. Schwind et al.'s recent study also highlighted the lack of research of the integration of mindfulness in higher education curriculums.

Mindfulness has been described as a learned skill, to be developed and refined through on-going practice (Kabat-Zinn, 2013). Interventions, such as MBSR techniques have been noted to reduce stress (Baghurst and Kelley, 2014; Holzel et al., 2010; Mrazek et al., 2013; Oman et al., 2008). These findings supported the need of the current study, on the examination of in-class, stress reduction techniques as a way to possibly mitigate the effects of acute stressors students face on a daily basis.

While previous studies independently asserted the stress and memory connection, as well as the connection to stress and stress reduction techniques, no study integrated all of these variables to assess the potential impact of a stress reduction intervention on levels of distress and memory function in an academic setting. While a review of literature discovered various studies examining the effects of different types of meditation (i.e., non-sectarian, modified MBSR) on mood and stress (Del Prato, Bankert, Grust, &

Joseph, 2011; Lane, Seskevich, & Pieper, 2007), no study was found within the literature, which employed the use of brief stress reduction techniques (i.e., 15 minutes), as a means to lower distress levels and thereby improving memory function, as tested in an academic environment. One study of patients with a diagnosis of fibromyalgia, found these patients coped better with pain levels when diaphragmatic breathing was used on a regular basis (Paolucci et al., 2016), which indicated the potential usefulness of this stress reduction technique in other settings, such as in an education classroom. After a thorough review of the literature, the closest study found was from Ramsburg and Youmans (2014), an examination of 6 minute, in-class meditation techniques, that assessed mood factors, behavior, and cognition during college lectures. However, this study did not examine the impact of acute stress levels on memory functions.

After a review of literature, no study was found which incorporates the components of distress, memory, and the use of MBSR. Examining one time, brief mindfulness meditation techniques, to determine the effectiveness of such stress reduction techniques on memory functioning, while using measures of formal memory assessments, has not been carried out prior to this study. This study examined the effect of in-class, brief mindfulness meditation on the levels of distress and memory performance of college students.

Stress and Educational Outcomes

It was shown that college students often encountered short-term, acute stressors throughout the day (i.e., stress over an upcoming examination, difficulties finding a parking spot, walking into class unprepared for the lecture, etc.). These were generally

adaptable, but as mentioned, these could also have negative effects on overall health (i.e., changes in immunity, increases in anxiety and somatic symptoms such as headaches) and academic success (Chang, 2006; Rayle & Chung, 2007; Schneiderman et al., 2005; Baghurst & Kelley, 2014; O'Donovan & Hughes, 2008). Considering roughly 80% of college students felt they experienced stress on a daily basis (Associated Press Survey, 2008; Pierceall & Keim, 2007), the educational impact of distress may be detrimental to educational outcomes.

Ryan (2009) studied community college students and discovered the top seven stressors, listed in order from most distressing, according to student reporting: minor hassles, such as long lines and transportation; deadlines; too many demands; interruptions in academic goal achievements; poor access to resources; competition; and failing coursework. Those students who believed daily hassles were out of their control saw the situation as even more stressful. In another study, it was found that academic demands were the most compelling source of stress among college students (Pierceall & Keim, 2007). A number of studies which were reviewed focused on students in the medical field. In one such study, medical undergraduate students were found to experience fear of failure, anger, and even feeling incompetent when faced with stressful situations. This study determined student concentration levels, problem solving abilities, and decision-making skills were all hampered by increased levels of stress, as measured using the Perceived Stress Scale (Sajid, Ahmad, & Khalid, 2015). Commensurate with other previously mentioned research findings, a 2008 study in Sweden also found stress among university students was much higher than their peers not attending post-secondary

training (Vaez & LaFlamme, 2008). Vaez and LaFlamme (2008) discovered a negative association between academic performance and the degree of stress encountered by students. The study found students with better stress appraisal skills and healthy coping styles yielded better scores on measures of academic performance. Another study echoed these findings, however, in a younger population (Arsenio & Loria, 2014). Arsenio and Loria (2014) noticed middle school students in their study, with negative moods and negative affect during academic tasks, had lower GPAs. It was found the higher the academic stress, the more negative the affect and general mood of the students. These findings demonstrate stress affects academic performance.

The Stress and Memory Connection

Stress has been considered an inevitable part of life, therefore understanding its effect on memory function was important in the authentication of stress reduction techniques as a means to improve memory functioning (McEwen, 2007). McEwen (2007) explained the brain is the first receiver of stressful situations, which then determines the level of stress a stimulus should be expected to create and the body acted accordingly. Through this activation of brain functioning, higher-level cognitive processes, such as decision-making and memory were found to be affected by stress.

Memory functions were studied as a complex process with many components, which worked in concert with one another to retain and retrieve experiences and knowledge. To first understand the potential underpinnings of stress to memory function, one must first understand the basis of brain function as it regarded to memory functioning. The study of comparative neuropsychology found interconnections between

short-term memory and learning with executive functions and frontal lobe involvement (Boutet, Milgram, & Freedman, 2007). "Reversal learning involve[d] shifting stimulus-reward contingencies. As such, reversal learning [wa]s considered a measure of executive function [which] refer[red] to a general cognitive mechanism thought to regulate a variety complex cognitive operations subserved by the frontal lobe such as flexibility, inhibition, problem solving, planning, and monitoring of short-term memory information" (p. 271). These higher level executive functions are heavily exercised in educational settings.

Hozel et al. (2010), studied the density of grey matter in the amygdala of participants, via MRI scans (pretreatment scans and post-treatment scans). It was found participants with higher rates of perceived stress, also had denser grey matter in the amygdala. These researchers implemented an 8-week MBSR program for all participants and then evaluated amygdaloid grey matter density in participants. Participants were in two groups; one group received more intensive 8-week MBSR intervention, while the second group had less intensive MBSR intervention and less opportunities for face-to-face training on techniques with instructors. Changes were noted in the density of grey matter following the implementation of MBSR. Individuals with a decreased perception of stress, were observed to have a decreased amount of amygdaloid grey matter. Hozel et al. (2010), found structural changes occurred in the brain when stress was experienced and when stress was better managed.

Examining the physiological reactions to stress, a crucial element to acknowledge in stress responses and the impact of memory is the hormone, cortisol (Kirschbaum et al., 1996). Cortisol, which has been largely regulated in the amygdala, was found to be a

contributor to memory functions. Kirschbaum et al. (1996), found that increased cortisol yielded poorer memory performance. A study of glucocorticoids (GCs) doses, which mimicked levels of cortisol in a stressful situation, found the higher doses of GCs resulted in reversible decreases in verbal declarative memory but did not affect nonverbal memory, attention, or executive function (Newcomer, et al., 1999).

Investigating other potential implications of stress on memory function, the timing of the experienced stress may impact memory functions (Dolcos, LaBar, Cabeza, 2005; Vogel & Schwabe, 2016). Researchers concluded time and context were factors when considering the impact of stress on memory (Vogel & Schwabe, 2016). For example, individuals who experienced trauma or other emotionally charged events, likely had a vivid recollection of those moments, although highly stressed in that moment, as the stress was most typically heightened at or just before the memory encoding process began (Dolcos et al., 2005; Vogel & Schwabe, 2016). Conversely, Nauret (2008) explained stress negatively affected memory recall. According to reviews by Vogel and Schwabe (2016), negative impairment of memory function occurred when material unrelated to the context of the experienced stressor was presented (i.e., learning neutral material). In addition, Vogel and Schwabe (2016) posited heightened stress around the time of learning new information increased memory abilities; while exposed to stress, even 30 minutes before learning new materials, negatively affected memory function of the newly learned material. Dolcos et al.'s (2005) findings of memory improvement of emotional and traumatic events, was disputed with previous research conducted measuring false memories in response to stressors (i.e., childhood sexual abuse) using

one self-assessment of rating levels of distress, the BSI (Bremner et al., 2000). This study found increased stress often leads to the encoding of false memories, which was agreeable to Baddeley and Hitch's theory of working memory (1974), in regards to stress interfering with encoding. Research also allowed for the exploration of eyewitness memory and the effect of stress on recall (Christianson, 1992). However, no literature was found demonstrating the use of stress reduction strategies, coupled with memory recall in emotional events, such as eyewitness trauma. Other research studies dispelled the notion of stress-induced enhancement to memory, contending stress can actually alter the reconsolidation in terms of memories that are highly emotional (Bremner et al., 2000; Yang et al., 2013). In an educational environment, increased worry or anxiousness, which were comorbid with heightened levels of stress, limited working memory capacity due to conflicted mental demands (Shi & Liu, 2016). LeBlanc (2009) also found increased levels of stress served as a barrier to working memory functions, memory retrieval of newly learned material, impaired decision-making abilities, and poorer performance on tasks requiring divided attention.

Stress is considered an interfering factor in accurate memory functioning (Nauret, 2008). Kirschbaum et al (1996) postulated stress hormones can be thought of as invaders, which hampered the potential of brain function, including memory retention and recall. One such hormone, cortisol, which is largely regulated in the amygdala, is found to be a contributor to memory functions. Kirschbaum et al. (1996), found increased cortisol yielded poorer memory performance. A study of glucocorticoid (GC) doses, which mimicked levels of cortisol in a stressful situation, found the higher doses of GCs,

resulted in reversible decreased verbal declarative memory, but did not affect nonverbal memory, attention, or executive function (Newcomer et al., 1999). Vogel and Schwabe (2016) found exposure to GCs after learning or around the time of memory retrieval, impaired memory retrieval. Another study corroborated the stress-memory connection, which studied the cognitive function in a group of elderly individuals (Anderson et al., 2014). Researchers discovered the elderly participants who experienced more distress, showed elevated adrenocortical hormones, deterioration of prefrontal cortex activity, and declined memory function (Anderson et al., 2014). These studies (Anderson et al., 2014; Kirschbaum et al., 1996; Newcomer et al., 1996; Vogel & Schwabe, 2016) provided evidence of hormonal disruption as stress was experienced and memory functions decreased.

While the effect of cortisol has been most widely studied regarding the stress effect, researchers also found, even short-term stress, interfered with the brain's learning capacity and memory ability (Chen et al., 2008). These researchers found that in as little as a few hours of stress exposure, loss of dendritic spines in the hippocampus, spurred on by the release of corticoptropin-releasing hormone (CRH), adversely affected the learning and memory capacity of participants. This study further indicated the need for stress reduction techniques even among individuals who experienced short-term stress.

Memory, Stress, and Educational Outcomes

Nauret (2008) contended, stress strains memory functions and that stressed students had greater difficulties processing and encoding newly learned material for later retrieval than their non-stressed counterparts. Roberts et al. (2011) determined the

connection between memory function and academic performance was robust, but this study did not examine the effects of stress. Schwabe and Wolf (2010) studied forty-eight healthy men and women, after intentionally exposing participants in an experiment group to stressors (but not measuring levels of distress), while learning a short list of words and participants in the control group were not exposed to stressors. The following day, the participants' recall of the word list was tested. It was discovered participants in the experimental group had an impaired ability to recall the word list when compared to participants in the control group who did not experience the stressor. Joels, Pu, Wiegert, Oitzl, and Krugers (2006) examined the exposure time to a stressor and determined cognitive intrusions in the memory processes were more apt to occur when an individual experienced the stressful event prior to learning new information. Kemeny (2003) examined the psychological and physiological factors as they related to stress exposure, including the impact of the autonomic nervous system, immunity, as well as cognitive appraisals of social status and even self-esteem. Palmer et al. (2014) studied the ramifications of stress on psychological functioning. However, these researchers also examined cognitive functioning when individuals are experiencing stress and fatigue, using portions of the Wechsler Memory Scale-III (WMS-III). Palmer et al. (2014) demonstrated a decline in overall memory as higher levels of stress and fatigue were reported. According to Baddeley and Hitch (1974), stress interfered with encoding and consolidating material, which decreased memory recall and overall memory function.

Although previous research investigated the effects of stress on memory function, no current research investigated the tri-directional effects of distress, memory, and

academic performance. Memory and learning was highlighted by Cowan (2014) who determined the importance of working memory on learning and education. Cowan (2014) defined working memory as crucial to learning processes in abstract terms, as the place where finite amounts of information were kept prior to either encoding and moving to long-term memory or discarding. Attention and decision-making skills are considered vital to good working memory, as good working memory was seen as an individual's ability to recall past knowledge and experiences, compared and contrasted those to newly presented material, and sorted through the complexities of the newly presented material to determine where it *fit* with what was and what was not already known. Aronen, Vuontela, Steenari, Salmi, and Carlson (2005) also researched the role of working memory on learning and postulated frontal lobe dysfunctions, such as attention deficit hyperactivity disorder (ADHD), anxiety, and depression, correlated to a greater number of mistakes on tasks requiring working memory and poorer overall memory in children tested aged 6 to 13. While the Aronen et al. (2005) study was not performed on adults, nor did it measure stress, per se, the previously discussed comorbidity of stress and psychological symptoms, such as depression and anxiety, was generalized to an adult learning population and provided for further need of research in this area. These studies support the need for further research on levels of distress, managed and unmanaged and the effects on memory.

Relevancy to the Student Population

According to Marks et al. (2008), stress was pondered as commonplace in society. Researchers identified increased stress levels among college students, therefore, learning

effective ways to manage stress were vital to the cognitive growth of individuals, specifically memory function (Associated Press Survey, 2008; Vaez & LaFlamme, 2008). A study by Parker, Kupersmidt, Mathis, Scull, and Sims (2014), examined the potential effectiveness of mindfulness education on elementary students and discovered increased self-regulatory skills among participating elementary students. Schonert-Reichl et al. (2015), discovered in spite of the benefits of mindfulness, as studied in other contexts, there were few mindfulness-based education programs available, despite overwhelming evidence mindfulness increased attention and concentration, increased emotional self-regulation, and decreased depressive symptoms and anxious features. Another study, found mindfulness meditation decreased levels of stress and anxiety in college students (Bamber & Schneider, 2016). These studies examined the efficacy and usefulness of mindfulness programs in an educational setting and discovered potential benefits (see Bamber & Schneider, 2016; Parker et al., 2014; Schonert-Reichl et al., 2015).

The social implications of utilizing components of mindfulness meditation to lower stress levels, thereby improving memory functioning, may have far-reaching implications. As stress levels normalized, memory and academic performance were postulated to improve. Increased memory function and academic performance, may lead to the reduction of college attrition rates (Baumeister et al., 2003). Considering 2015 statistics, which asserted only 33% of adults in the United States obtained a bachelor degree (Ryan & Bauman, 2016), increasing the number of college graduates, would ultimately increase individual earning potential and provide greater economic stability within society (Raniseski, 2014). In addition to effects on memory, mindfulness

meditation techniques also improved physical and emotional wellbeing (Gross et al., 2009). For example, Gross et al. (2009) highlighted the usefulness of MBSR techniques in improving health-related quality of life (QOL) and affective symptoms, including anxiety, depression, and insomnia. Pierceall and Keim (2007) found 78% of college students reported at least moderate levels of stress. Levels of stress were found to decrease when implementing mindfulness techniques as part of college course curriculum students were offered additional tools for managing stress (Pierceall & Keim, 2007). Vaez and LaFlamme (2008) discovered a negative association between academic performance and degree of stress, which led to additional support of the potential value of incorporating mindfulness practices in academic settings. Albrecht, Albrecht, and Cohen (2012) also identified a gap in the literature which explored the value of mindfulness in the classroom. The researchers found literature on mindfulness in education curriculum tended to focus on teacher stress levels and classroom management (Albrecht et al., 2012). Integrating mindfulness in educational curriculum was a recommendation after Albrecht et al.'s (2012) review of existing literature, which corresponded with previous recommendations from Shapiro et al. (2008). These findings suggest educational benefits in the promotion for further study into the use of mindfulness in educational settings (see Albrecht et al., 2012; Baumeister et al., 2003; Gross et al., 2009; Pierceall & Keim, 2007; Vaez & LaFlamme, 2008).

Framework

The theoretical basis for this study was the cognitive activation theory of stress (CATS) (Reme et al., 2008) and Baddeley Hitch's theory of working memory (Baddeley

& Hitch, 1974). CATS emphasized that learning plays an important role in all aspects of stress and coping (Reme et al., 2008). Reme et al (2008) explained stress reactions are based on acquired expectancies of outcomes of a stressful event and our expectation of being able to deal with the event. Expectancies can be defined by acquisition strength (e.g., how strong the learning is that an event is threatening), perceived probability (e.g., predictability and control over an event) and affective value (attractive, aversive or neutral). In CATS, coping is the expectancy that you can change stress, while helplessness is the expectancy that your actions have no effect, and hopelessness that an individual's actions had negative effects.

Baddeley and Hitch's theory of working memory allowed memory functions to be further examined when student participants self-reported levels of stress. Baddeley and Hitch's theory of working memory (1974) contended new information first goes through short-term memory, which does not guarantee it will move into long-term storage. The importance of encoding was noted in Baddeley and Hitch's research that highlighted the importance of moving information to long-term memory (Baddeley & Hitch, 1974). Baddeley and Hitch (1974) expanded on Atkinson & Shiffrin's model of memory to include overall cognition in memory functions. Baddeley and Hitch (1974) explained memory uses the central executive system to allow for retrieval and selective attention, the phonological loop (auditory verbal information), and the visuospatial sketchpad (visual information). In 2012, Allen et al. conducted experiments in order to explain what appeared to be contradictory findings from their previous research on attentional load effects of memory. Commensurate with past research, it was determined that when

participants were tested on memory function while also engaging in attentional demanding tasks, the concurrent attention demanding task impaired memory function in both single feature memories and memory binding conditions. In Allen et al. (2012), this theoretical model was used when investigating memory functions and used the WMS-IV to test memory function, when the attention of participants waned with self-reported levels of perceived distress. According to Baddeley and Hitch's theory, focusing on properly encoding material is essential to accurate memory recall, making the theory of working memory suitable as a theoretical framework for the current study (see Baddeley & Hitch, 1974).

Present Study

While literature examined individual components of stress, memory, and learning, as well as, bidirectional effects of stress and memory, memory and learning, no research examined the tri-directional effects of distress, memory, and learning. In addition, while research in mindfulness meditation has been emerging in the past decade, research primarily focused on one component (stress reduction), not the implications of mindfulness on levels of distress, memory, and learning acquisition. After a thorough review of existing literature, a significant gap in research was determined, yielding the necessity for further examination to expound on the use of mindfulness techniques on stress and memory. Therefore, it was prudent to examine the effects of mindfulness techniques on levels of perceived distress and memory function in a post-secondary educational setting.

Summary

In this literature review, the pervasive nature of stress among college students was detailed, as well as the impact of heightened levels of distress on memory. Studies examining the beneficial effects of mindfulness-based interventions on stress and stress-related conditions were also reviewed. This literature review explained the tenants of MBSR, as well as comprehensive studies detailing the use of MBSR within a variety of modalities. Among the literature reviewed, researchers designated the interconnection of high levels of distress and reduced memory function (see Nauret, 2008). The effects of mindfulness on stress, memory, and educational outcomes warrant additional research. Chapter 3 contains a description of the methodology, setting of the study, instruments, and analyzed data used in this research study. It describes the data collection process and analysis which determined the levels of perceived distress of college students and the relationship between memory functioning and learning acquisition when mindfulness techniques were used.

Chapter 3: Research Method

Purpose of the Study

The purpose of this study was to determine if the brief mindfulness meditation techniques of diaphragmatic breathing and sitting meditation, two components used in MBSR), employed in a community college classroom setting, prior to a memory assessment, increased memory retention and recall by reducing levels of perceived distress in college students. Using the theoretical constructs from multiple literature reviews on acute stress, memory retention and recall, as well as research on MBSR (Kabat-Zinn, 2013), secondary data was collected from first-year college students at a 2-year community college in the Houston metropolitan area during 2018. Data collected measured levels of perceived distress and memory function in those exposed to a brief mindfulness intervention compared with controls. The treatment group was exposed to brief exercises and practices in diaphragmatic breathing and sitting meditation while listening to binaural beats, at a medium volume, in dimmed lighting. The control group was exposed to dimmed lighting and binaural beats, at a medium volume, to determine differences between levels of perceived distress in the treatment and control groups and memory recall.

This chapter describes methods and procedures used in assessing data including research questions, research design, sample population, conceptual framework, instrumentation used, and secondary data. Finally, this chapter discusses the plan for data analysis.

Research Questions

This study addressed three research questions:

RQ1. Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) lower levels of distress in a treatment group?

$H_0$1. Exposure to a brief mindfulness intervention has no effect on levels of distress among the treatment group when compared to no treatment controls.

H_a1. Exposure to a brief mindfulness intervention lowers levels of distress among the treatment group when compared to no treatment controls.

RQ2. Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) improve memory function in a treatment group?

$H_0$2. Exposure to a brief mindfulness intervention has no effect on memory function among the treatment group when compared to no treatment controls.

H_a2. Exposure to a brief mindfulness intervention improves memory function among the treatment group when compared to no treatment controls.

RQ3. Do changes in perceived levels of distress mediate the effects of exposure to mindfulness on memory function?

$H_0$3. Changes in perceived levels of distress do not mediate the effects of exposure to mindfulness on memory.

H_a3. Changes in perceived levels of distress mediate the effects of the exposure to mindfulness on memory.

All research questions were addressed using secondary data collected from college students at a 2-year community college in the Houston metropolitan area, which

assessed scores of distress on the following dimensions of the BSI: anxiety, somatization, obsessive-compulsive, and depression (pre and posttest) and scores on the WMS-IV.

Research Design

This study used secondary data collected from a community college with an interest in the use of stress reduction techniques and student stress levels. A convenience sample was applied from interested, available first-year students at a 2-year community college in the Houston metropolitan area. Using randomization, participants were assigned to a control group not receiving mindfulness meditation (Group A) or treatment group receiving mindfulness meditation (Group B), via the computer-generated research randomizer. Changes in levels of perceived distress and memory function were examined, comparing levels of these variables in treatment versus control group participants following the brief mindfulness or control intervention. The potential mediating role of changes in levels of perceived distress was also examined in control and treatment groups.

This study employed a field experiment design using independent samples (Cohen, Cohen, West, & Aiken, 2003). While this method was more time consuming then other methods, such as a quasi-experimental design, and required a greater number of participants, results yielded information on the potential usefulness of intentional diaphragmatic breathing and sitting meditation in a college classroom for reducing distress and improving memory function.

Sample Population

Secondary data was collected from first-year college students at a 2-year community college in the Houston metropolitan area in 2018. This data was collected under sponsorship of the community college's Institutional Effectiveness and Review department (Appendix A), as part of a larger institutional interest in stress management. In the current study, this secondary data was examined to ascertain the effectiveness of brief, in-class mindfulness meditation techniques (diaphragmatic breathing and sitting meditation) on students' levels of perceived distress (pre and posttest BSI) and memory function (WMS-IV). Approval from Walden University's Institutional Review Board was obtained to collect and analyze data (Appendix B).

A convenience sample was used as participants were recruited from a 2-year community college in the Houston metropolitan area, a campus approximately 30 miles south of Houston, which comprised of over 5,000 students, of which approximately 27% were first-time college students, based on figures from 2013 U.S. News and World Report. Among the general student body, 42% were males, 58% were females; 52% were White, 30% were Latino, 10% were Black, and 8% were Other; 75% were 18 years or older (U.S. News and World Report, 2013. Recruitment occurred through postings in the Student Center and postings on various community boards around the campus (Appendix C).

To determine the sample size, alpha power was set at 0.05, as it is standard practice to do (see Burkholder, n.d.; Field, 2013; Lund Research, 2018). The statistical power ($1 - \beta$) was set to .80, which is the probability of finding a statistically significant

difference when there truly is one. According to Cohen's method of effect size, the hypothesized effect size was moderate (see Segerstrom & Miller, 2004; Statistics Solutions, 2017). Burkholder (n.d.) suggested, "[f]or psychological studies, you may generally assume a small to medium effect size" (p. 3-4). With these parameter values in place, according to G*Power Analysis 3.1 using *F*-tests linear multiple regression: Fixed model, R^2 increase, and a priori power analysis, with a medium effect size, 0.05 level of significance for a Type I error at 80% statistical power, the sample size should be 55 participants (Faul, Erdfelder, Buchner, & Lang, 2009). This sample size was rather commensurate with previous research of mindfulness-based interventions. In a study by Kar, Mukhtar, Ibrahim, Shian-Ling, and Sidik (2015), 76 participants were used in a hierarchical multiple regression analysis study which analyzed changes in outcome variables of medical students in Malaysia who participated in an at-home DVD mindfulness study program and the control group of students who did not participate in the intervention. Kar et al. (2015) found and average effect size (0.13), which was close to a medium effect size ($f^2_B = 0.15$).

Another study of mindfulness was conducted on patients with multiple sclerosis, using mindfulness as a predictor variable and correlated with a variety of dependent variables (perceived stress, resiliency, adaptive coping, maladaptive coping, mental health related quality of life (QOL), and physical health-related QOL (Senders, Bourdette, Hanes, Yadav, and Shinto, 2014). I first used bivariate Pearson correlation coefficients, and then used linear regression to examine the associations between mindfulness and the dependent variables. Senders et al. (2014) analyzed data from 119

participants and findings were considered robust, indicating an adequate sample size. In order to exceed best practices, the targeted sample size was 55 participants. Demographic numbers of first-year students at a 2-year community college in the Houston metropolitan area were commensurate with current enrollment numbers, this sample size consisted of 4% of the target population who participated in the study, which was attainable. The current study consisted of 57 participants. This sample size allowed the experiment to be manageable and allowed for group sizes not to be oversized, therefore limiting the potential for increased distractions among participants during data collection.

Fifty-five students were projected to participate in the data collection; however, the actual number of participants was slightly greater, with 57 students participating. Packets, including demographic sheet, informed consent, and testing sheets were prearranged into individual packets, each packet was numbered in the top right-hand corner of each page (Packets 1-55). Students included were aged 18 or older, which was indicated on a demographic sheet, along with their gender. Additionally, on the demographic sheet, there were three sections in which participants had the opportunity to indicate possible accessibility issues: “Check here if you have a significant, unaided visual impairment.” “Check here if you have a significant, unaided fine motor impairment (i.e., extreme difficulties holding a pencil).” “Check here if you have a significant, unaided hearing impairment.” No significant impairments were noted among the participants. The inclusion criteria consisted of first-year college students enrolled in credit courses at a 2-year community college in the Houston metropolitan area, aged 18 years or older. Age was verified through the participant self-disclosed demographic sheet

collected by the experiment facilitator. During the demographic collection, it was noted two students were less than 18 years of age; these students were thanked for their interest and excused from the study. Participants met in an assigned room at the sponsoring college on a Wednesday at 9:30 am. For the sake of confidentiality, participants were given a piece of paper with a sequential number, one through 65, upon entering the room. Once every participant had an assigned number, which was received upon entering the room, the lead facilitator then used computer-generated randomization (randomizer.org), using two sets of unique numbers per range, numbers one to 65. Students were randomized into one of two groups: treatment ($N = 29$) or control ($N = 28$). Participant numbers in Set 1 of the randomization, the control group, were told to find a chair at one of the tables in the existing room where the assistant research facilitator remained. Participant numbers in Set 2, the treatment group, of the randomization were called to stand and exit the room with the primary research facilitator and enter another room where they were then told to find a chair at one of the tables in the room. The initial meeting and experiment took approximately one hour, with 15-minute group debriefing occurring at the conclusion of the field experiment.

Procedures and Data Collection

Secondary data was collected as follows: Participants were first welcomed in a prearranged meeting room by two facilitators, one for the treatment group (the primary research facilitator) and one for the control group (the assistant research facilitator). The facilitators were aware of the purpose of the study. Instructions were provided to both facilitators to ensure continuity (Appendix D and E). Both facilitators hold current

licenses under the Texas State Board of Examiners of Psychologists and both have knowledge of MBSR, including training in the Palouse Mindfulness-based Stress Reduction course (Palouse Mindfulness, 2017).

As a large group in the prearranged meeting room, participants were provided a piece of paper with a sequential number, 1 through 65. This number indicated their participant number and corresponded to group assignment and subsequent forms (all prenumbered to match the participant number). Using randomizer.org, the primary facilitator divided the participants accordingly by calling out their number and corresponding group assignment (treatment and control). Set 1 from the randomizer, the control group (Group A), were called out by numbers and asked to find a chair at the table in the room where they were facilitated by the assistant facilitator. The room was designed to hold approximately 35 students. Set 2 from the randomizer, the treatment group (Group B) was then called out by numbers and led to a similar room by the primary facilitator, which was designed to hold approximately 35 students.

Once in their respective groups and rooms, the demographic sheet (Appendix F) and two informed consent forms (one for the participant to sign and return and one for the participant to keep for their records) were dispersed to the participants according to their assigned numbers, as each form was prenumbered. The demographic sheet contained a box to check if they were at least 18 years of age, box to signify gender (male or female), and another box to check if they were a first-year student. There were also three other boxes to check if applicable, indicating possible accessibility issues, if the participant felt they had a significant, unaided visual, fine motor, or hearing impairment, as these

disability issues had the potential to effect performance. The consent form was explained to the participants. Participants were told to keep one copy of the consent form with their assigned number and return a signed consent form with the demographic sheet. Demographic sheets and informed consents were then collected and placed in corresponding file folders, numbered one through 65 for each participant.

Participants were given 24-items from 4 dimensions (anxiety, somatization, obsessive-compulsive, and depression) of the BSI, which was prenumbered per participant. Instructions were provided to the groups to rate themselves from 0 to 4 with how they feel each statement applies to them: 0, not at all; 1, a little bit; 2, moderately; 3, quite a bit; or 4, extremely. The BSI statements were read to each group to ensure participant understanding as each participant circled the corresponding self-rated number for each statement. Upon completion, the BSI was picked up by the facilitator and placed in a folder labeled Pretest BSI. The BSI was used as a measurement indicator to ascertain initial levels of perceived distress. In both Group A and Group B's rooms, lighting was then dimmed and soft music, with binaural beats, was played in the rooms via sound system, at a medium volume (Audio Binaural Beats, 2014). Participants in Group A, the control group, were instructed to close their eyes and relax for 15 minutes. Participants in the mindfulness meditation group were instructed to practice diaphragmatic breathing and sitting meditation, while seated in chairs, while the primary facilitator demonstrated these methods and walked participants through a 15-minute session using these techniques (see Kabat-Zinn, 2013). During the 15-minute session, the primary facilitator read the Palouse Sitting Meditation Script (2017), as participants practiced sitting mediation and

diaphragmatic breathing (Appendix H). The lights were returned to the undimmed state. Participants were given a posttest BSI to assess for levels of distress following the 15 minutes of treatment intervention or control setting. Commensurate with all forms, the posttest was prenumbered per participant and given to the participants according to their assigned participant numbers. Upon completion, these were collected by the facilitator and placed in a folder labeled Posttest BSI. Following the conclusion of the field experiment, the primary facilitator scored the pre and post-BSI according to DeRogatis's scoring methods, as individual dimension *t* scores were compared to the appropriate gender, nonpatient normed group, per the administration manual (see DeRogatis, 1993). The 4 dimensions were scored, yielding separate scores for each dimension: SOM, O-C, DEP, and ANX, per individual participant, and from the 4 dimensional scores, a composite score was tabulated. Using DeRogatis's scoring methods, each dimension score was calculated by the sum of the values of items within each dimension and divided by the number of items endorsed within each dimension, yielding a raw score (see DeRogatis, 1993). The raw score was converted to a gender-specific *t* score for each dimension. The total composite score was calculated by the sum of the values of items on the 4 dimensions (SOM, O-C, DEP, and ANX) and divided by 24, the total number of items within those dimensions, yielding a raw score. The raw score was then converted to a gender-specific t-score known as the Global Severity Index (GSI). According to DeRogatis (1993), a *t* score greater than or equal to 63 within each dimension will represent significant distress on each particular subscale and a GSI composite *t* score greater than or equal to 63, will represent significant perceived distress.

Following the completion of the posttest BSI, participants were given two subtests of the WMS-IV to assess for memory function. The logical memory and visual reproduction portions of the WMS-IV were administered. Instead of providing verbal responses, participants wrote their responses, which were collected by the facilitators. If a participant noted a significant, unaided visual, fine motor, and/or hearing limitation, then the corresponding subtest was not included in data analysis (e.g., visual reproduction subtest would not be included in data analysis in participants that indicated fine motor and/or visual impairments).

The facilitators reminded the group participants not to talk during the collection of data, as the interference could skew the results. The facilitators provided each participant a piece of blank paper, prenumbered with their assigned participant numbers in the top right-hand corner. The participant groups were instructed to listen as the verbal passages from Logical Memory I, Story B and Story C, were read to them by the qualified testing facilitators. Participants were told to not pick up the pen until after the story had been read in its entirety. Story B was read first. Instead of offering the standard verbal responses from participants, as would be done in an individual evaluation, participants were instructed to individually write down as many details as they could remember on the logical memory portions of the test on the blank paper provided to them by the facilitators. After the passage was read, participants were then told to pick up their pen and write as many details as they can remember about the story. Participant papers were then collected by the facilitators and collected papers were placed in a file folder labeled Logical Memory I, Story B. Another blank piece of paper, prenumbered with their

assigned participant numbers, was provided to each participant by the facilitators. Participants were instructed to keep their pens down and listen as the facilitator read Story C. Once the story was read, participants were told to pick up their pen and again, write as many details as they can remember from Story C. The facilitators picked up the participant papers and each group facilitator inserted these collected papers in the file labeled Logical Memory I, Story C.

The visual reproduction items were shown to the group for the allotted time of 10 seconds, per the administration manual (see Wechsler, 2009). In the room, participant chairs were arranged to sit so other participants had no ability to see other participant responses. Participants were given one sheet of blank paper by the facilitator, prenumbered with their assigned participant numbers in the top right-hand corner. Participants were told to keep their pens down and look at the projector screen. After ensuring all participant pens were down, the facilitator showed Item 1 of Visual Reproduction I for 10 seconds. After 10 seconds the screen was blank and the stimulus item was no longer present. Participants were then told to pick up their pen and draw Item 1, as best as they could recall. Upon completion, the paper was picked up by the facilitator. This same procedure was repeated for the remaining Visual Reproduction Items 2 through 5. The facilitators picked up the participant papers and each group facilitator inserted these collected papers and filed in a folder labeled Visual Reproduction I.

The facilitators then provided another blank paper to each participant, prenumbered with their assigned participant numbers in the top right-hand corner of the

paper. Once the blank papers were distributed, the facilitators told the participants to write as many details as they could remember about Story B. These papers were then collected by the facilitators and filed in a folder labeled Logical Memory II, Delayed Recall. The facilitator then provided each participant with another piece of blank paper, prenumbered with his/her assigned participant numbers in the top right-hand corner. The facilitator then instructed the participants to write down as many details as they could remember about the second story (Story C). Upon completion, the facilitators picked up the papers. These papers were filed in the folder labeled, Logical Memory II, Delayed Recall.

The facilitators then provided five blank papers to each participant, prenumbered with their assigned participant numbers in the top right-hand corner of the paper. Participants were told to pick up their pen and draw the designs they were previously shown, as best as they could recall. Participants were told they could draw them in any order. Upon completion, the facilitators picked up the papers. These papers, five per participant, were filed in a folder labeled Visual Reproduction II by the facilitators.

The participants were thanked for their participation. A quick debriefing occurred and led by the facilitators in the individual groups. In the control group room, the assistant facilitator explained they were part of the control group and did not receive the brief mindfulness meditation. Participants were then taught and led through brief exercises of sitting meditation and diaphragmatic breathing. Meanwhile, in the treatment group debriefing session, the primary facilitator explained to the group they were taught the mindfulness meditation techniques of sitting meditation and diaphragmatic breathing,

which was then reviewed. Upon exiting the room, participants were again thanked for their participation, were given a bottle of chilled water, and a handout explaining the techniques of diaphragmatic breathing and sitting meditation, as well as contact information for local mental health clinic, the community indigent health clinic, and the College's Counseling Center (Appendix I).

The file folders were collected by each facilitator and placed in a file box, one labeled Group A and one labeled Group B, for the respective groups. The WMS-IV was scored within the next week by the primary facilitator utilizing the WMS-IV scoring guidelines and administration manual (see Wechsler, 2009). Scaled scores were normed by age group and each scaled score corresponded with a cumulative percentage, based on age norms. The subtest Logical Memory I and Logical Memory II are components of the Auditory Memory Index on the WMS-IV. Visual Reproduction I and Visual Reproduction II are components of the Visual Memory Index on the WMS-IV. The results of the WMS-IV testing were attached to each participant's pre and posttest BSI scores, and demographic sheet. WMS-IV results were calculated using raw scores and then converted to scaled score equivalents and cumulative percentages normed according to age on Logical Memory I and II and Visual Reproduction I and II per the WMS-IV administration manual (see Wechsler, 2009). Wechsler (2009) provided descriptors and interpretation of scaled scores and percentile rankings (p. 151-152), which are detailed in the following table.

Table 2.

WMS-IV: Reporting and Descriptors of Scores

Scaled Score	Percentile Ranking	Qualitative Descriptor
19	99.9	Very Superior
18	99.6	Very Superior
17	99	Very Superior
16	98	Very Superior
15	95	Superior
14	91	Superior
13	84	High Average
12	75	High Average
11	63	Average
10	50	Average
9	37	Average
8	25	Average
7	16	Low Average
6	9	Low Average
5	5	Borderline
4	2	Borderline
3	1	Extremely Low
2	0.4	Extremely Low
1	0.1	Extremely Low

According to DeRogatis (1993), the facilitator scored the BSI dimensions and normed for non-clinical participants and gender, any score on any dimension at or above 63 was considered significantly stressed for that participant. Each dimension has a specific number of potential responses: 7 for somatization, 6 for obsessive-compulsive, 5 for depression, and 6 for anxiety, yielding 24 total responses. Each response is rated on a Likert scale 0 (not at all) through 4 (extreme). Participants BSI responses were scored by adding each Likert scale response within the specified dimension. Total sum of item responses were added together which yielded a Total Sum. The Total Sum was then divided by the Total Number of Responses, in this case 24, which created a raw score for the GSI. Utilizing the BSI conversion chart, normed for non-patient adult males and non-patient adult females, raw scores were examined and converted to t-scores. Per the BSI administration manual, a total GSI score of 63 or greater was considered significantly distressed (DeRogatis, 1993).

Instrumentation

Two tools were used in this study, both empirically tested, the BSI and WMS-IV.

Brief Symptom Inventory

The BSI allowed for participant ratings across 4 dimensions of psychological stress. The BSI consists of 53-items, measuring nine dimensions of distress. The BSI is the abbreviated version of the Symptom Checklist-90 (SCL-90) (DeRogatis & Cleary, 1977). Evidenced found the BSI was highly correlated with the SCL-90 (.92 to .99). Additionally, convergent validity was found with the Minnesota Multiphasic Personality Inventory (MMPI) with coefficients ≥ .30 (DeRogatis, 1993).

The BSI is a self-rated, criterion referenced, 5-point Likert scale questionnaire, which used an interval measurement scale to determine the psychological functioning of participants (DeRogatis, 1993). The Likert scale rates levels of distress from ranges 0 (*not at all*) to 4 (*extremely*). The set time frame given with the BSI is to rate levels of distress *within the past seven days, including today*; however, DeRogatis and Cleary (1977) reported other specific time periods may be established for the assessment tool. The areas assessed for the purposes of this study were the domains of somatization (SOM), obsessive-compulsive traits (O-C, scale commonly described as cognitive functioning), depression (DEP), and anxiety (ANX), which comprised of 24-items (DeRogatis, 1993). The dimensions chosen for the purposes of this study, were selected based on previous research contending individuals who were experiencing heightened levels of distress acknowledged an increase in feelings of anxiousness, depressive symptoms, increased inattentiveness, increased restlessness, and an increase in somatic complaints (Fan, Blumenthal, Watkins, & Sherwood, 2015; Milojevich & Lukowski, 2016; Novotney, 2014; Pierceall & Keim, 2007; Sajid et al., 2015; Saleh et al., 2017; Shi & Liu, 2016). The dimensions omitted on the current questionnaire included hostility, paranoid ideation, phobic anxiety, psychoticism, and interpersonal sensitivity. Additionally, the item related to suicidal ideations on the depressive dimension was also omitted (DeRogatis, 1993). These items were omitted from the current questionnaire as they were deemed to not be relevant to the intent of the study, which was to examine levels of acute distress within the participant groups in order to examine potential changes following a brief intervention. A 2010 study found support in the reliable measurement of distress in each

of the nine dimensions, and concluded that any of the single subscales could be studied independently (Mohammadkhani, Dobson, Amiri, and Hosseini, 2010).

DeRogatis (1993) found reliable internal consistency with Cronbach alpha coefficients ranging from .71 to .85 on the BSI. Using Cronbach's alpha, high internal reliabilities were found for the dimensions used in the current study: Anxiety ($\alpha = .84$), Somatization ($\alpha = .87$), Obsessive-Compulsive ($\alpha = .79$), and Depression ($\alpha = .87$) (Mohammadkhani et al., 2010). Croog et al. (1986) found alphas from .78 to .83 in a double-blind study of to analyze effects of antihypertensive medications on the quality of life among 626 participants, as measured using the BSI. Test-retest reliability was found by DeRogatis (1993) to range from .68 to .91 among the nine subscales. Research findings by DeRogatis (1993) revealed no significant differences between males and females on the BSI scale. Additionally, findings of the BSI factors were discovered to not interfere with soundness based on differing cultures. According to Crameri et al. (2016), since the BSI items are symptom focused, rather than broadly focused, the BSI does not require additional time in order to see changes in symptoms between pre and posttest administration. The BSI was an appropriate instrument (Mohammadkhani et al., 2010).

Construct validity was found using confirmatory analysis goodness of fit comparing a 9-factor and unifactorial model of the BSI items. Agreement was found among different factor structures of the items including, nine factors, eight factors, six factors, five factors, and one factor. These findings indicated compatibility in item validity regardless of factor structure and support using the selected 4 dimensions on the current study (Pereda, Pero, & Forns, 2007).

Pre and posttest BSI results were picked up by the facilitators during the sessions and organized according to each participant's packet, as identified by participant number (demographics, pre and posttest BSI, and WMS-IV results). Pre and posttests were scored by the primary facilitator. A GSI t-score was calculated and used to determine what was considered significant perceived distress (see DeRogatis, 1993)

Wechsler Memory Scale-IV

Two subscales of the WMS-IV were used to assess for memory function. The WMS-IV is a widely-used tool to assess for memory and in this case, this assessment was given in a group setting, although results remained individualized. The logical memory and visual reproduction portions of the WMS-IV were administered (Wechsler, 2009).

The WMS-IV was chosen as a measurement tool for memory function because the test was designed for individuals in the 16- to 90-year-old range, which allowed for ages of the sample group. The WMS-IV also was designed with cultural considerations and normed for a diverse cultural population. High levels of internal consistency have been measured for the WMS-IV. Stability coefficients also were adequate, ranging from .81 to .83, while interscorer agreement ranged from .96 to .99 (Cassady & Dacanay, 2012). The construct validity for the WMS-IV has been thoroughly studied and indicated goodness of fit statistics among all age groups (see Chittooran, 2012).

WMS-IV data was collected by the facilitators during the sessions and organized according to each participant's packet, as identified by participant number (demographics, pre and posttest BSI, and WMS-IV results). The primary facilitator scored the WMS-IV in accordance with the WMS-IV administration manual. Raw scaled

scores range from 2 to 19. Scores between 2 and 3 are in the extremely low range. Scores between 4 and 5 are in the borderline range. Scores between 6 and 7 are in the low average range. Scores between 8 and 11 are in the average range. Scores between 12 and 13 are in the high average range. Scores between 14 and 14 are in the superior range. Scores between 16 and 19 are in the very superior range (see Wechsler, 2009).

Data Analysis

After considering other potential statistical analysis, such as only *t* tests to compare means of two groups, it was determined an independent sample *t* test was helpful to assess individual memory subscales, but also analysis of covariance (ANCOVA) and multivariate analysis of variance (MANOVA) were found to be necessary to allow for a more thorough investigation of multiple dependent variables and independent variables, while controlling for covariates, which permitted more robust tests without requiring multiple statistical analyses. ANCOVA, MANOVA, as well as, correlations, and descriptive statistics to analyze data. An independent-samples *t* test was used to compare means in the treatment and control groups on the variables of memory subtest scaled scores. The following assumptions were met to use an analysis of covariance (ANCOVA): (a) the dependent variable of posttest BSI scores and covariate of pretest BSI scores were both continuous; (b) the independent variable of MBSR consisted of two independent groups, treatment and control; (c) independence of observations existed in groups; (d) there were no significant outliers; (e) according to Shapiro-Wilk test for normality, the results of posttest BSI scores were normally distributed in the treatment group ($p = .64$) and control group ($p = .07$); (f) Levene's test was used and

demonstrated homogeneity of variances (p = .04); 7) The covariate of pretest BSI scores were linearly related to the dependent variable of posttest BSI scores; (g) homoscedasticity was demonstrated in the use of scatterplots; (h) homogeneity of regression of slopes was demonstrated (see Lund Research, 2018). The following assumptions were met for the use of an independent *t* test: (a) the dependent variables of WMS scores and BSI scores were continuous; (b) the independent variable of MBSR treatment and control group were two categorical, independent groups; (c) treatment and control groups demonstrated independence of observations; (d) no significant outliers existed in the data; (e) Shapiro-Wilk confirmed test for normality. Each dependent variable was normally distributed among each group ($p > 0.05$); (f) Levene's Test for Equality of Variances was used and demonstrated homogeneity of variances (see Lund Research, 2018). The following assumptions were met for the use of a multivariate analysis of variance (MANOVA): (a) the 4 dependent variables of memory subtests were all measured at the continuous interval level; (b) the independent variable of MBSR group consisted on two, independent groups, treatment and control; (c) treatment and control groups demonstrated independence of observations; (d) the sample size was adequate; (e) box plots noted demonstrated no significant outliers, which was confirmed by Mahalanobis distance; (f) skewness confirmed normality in the dependent variables; (g) a linear relationship was demonstrated for each dependent variable for each group within the independent variable of MBSR (treatment or control group) utilizing a scatterplot; (h) Utilizing Box's M, homogeneity of variance-covariance matrices was

demonstrated (p = .06); (i) the dependent variables of the memory subscales were moderately correlated (see Lund Research, 2018).

RQ1 asked: Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) lower levels of distress? This question was answered through an ANCOVA to compare postintervention perceived distress as assessed by the GSI t-score of the 4 dimensions (ANX, SOM, O-C, and DEP) of the BSI) used among the treatment and control groups, when adjusted for the covariate of pretest BSI scores.

MANOVA, an independent samples *t* test, and correlations were performed to answer RQ2, which asked: Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) improve memory function in a treatment group? In order to answer RQ2, scores on the WMS-IV were examined in the treatment and control groups. An independent samples *t* test was used, along with a correlation matrix, to examine individual WMS subtest mean scores in the two groups: MBSR treatment group and MBSR control group. A MANOVA was used to compare the individual WMS subtest scores as the dependent variable within the two independent groups: MBSR treatment group and the MBSR control group.

Utilizing a correlation matrix, WMS-IV scores were examined among individual participants assigned to the control group and the treatment group, to determine if significant differences existed between pre and posttest scores for RQ3. There was no need for mediation test as there was no significant change. The change in BSI scores were not correlated with any memory scale, therefore, there was no main effect.

Memory function was measured postintervention (random assignment allowed for the presumption of equivalency of groups on this variable). Any individual with missing values on collected data were not included in the subsequent analysis. Data analysis of statistical tests will be performed utilizing IBM SPSS Statistics 25.

The database structure consisted of the following variables within each research question and were used for statistical analysis in SPSS:

RQ1:

Mindfulness (independent categorical variable)

Group A: Control

Group B: Treatment

Posttest BSI scores (dependent variable)

Pretest BSI scores (covariate)

Gender (0 = male; 1 = female) (categorical covariate)

Age (continuous covariate)

RQ2:

Mindfulness (independent categorical variable)

Group A: Control

Group B: Treatment

WMS-IV scores (memory function) (dependent continuous variable)

Gender (0 = male; 1 = female) (categorical covariate)

Age (continuous covariate)

RQ3:

Mindfulness (independent categorical variable)

Group A: Control

Group B: Treatment

Pretest BSI GSI t-scores (independent continuous variable)

Posttest BSI GSI t-scores (independent continuous variable)

Differences between pre and posttest BSI Scores on the GSI t-score (independent variable)

WMS-IV scores (memory function) (dependent variable)

Gender (0 = male; 1 = female) (categorical covariate)

Age (continuous covariate)

Other statistical methods were considered to analyze data, including multiple regression and ANOVA. While regression analysis would have predicted an outcome variable on the basis of two or more independent (predictor) variables and compare the slopes of these variables (Lund Research, 2018; Schneider, Hommel, & Bletnner, 2010). Nelson and Zaichkowsky (1979), this was not necessary, since the covariates of age and gender were not correlated. Thompson (1986), contended that analysis of variance statistical methods were most commonly used among social science and educational researchers (from a historical standpoint, ANOVA represents the first multivariate method for researchers to employ). However, in this study, ANOVA would only examine differences in the means of each group, while ANCOVA was considered a more adequate test as it not only examined means, but adjusted those means to account for the

confounding variable of pretest BSI scores to demonstrate if there was a difference when comparing change scores of the posttest BSI in the groups. Separate *t* tests were used to analyze the independent variable of MBSR group as a means of association with the memory subscale scores. A MANOVA was chosen to examine the dependent variables of memory subscale scores and determine if differences existed on these variables in the independent groups of MBSR treatment and MBSR control. MANOVA is the appropriate statistical test when examining more than one dependent variable simultaneously. An independent sample *t* test was appropriate to examine means among memory subscales and the covariates of age and gender.

Threats to Validity

Because the age of participants in the current study was 18 years and older, the findings of the study may not generalize to younger students in a college setting. Along with age, other potential threats to external validity include baseline levels of perceived distress and field of study among participants, which may not reflect the general population of college students. The study findings may also not be generalized to other institutions, including 4-year universities or other post-secondary programs, including postgraduate. The findings in this study may not generalize to first-year college students in other regions, states, or countries. Another potential threat to validity was the number of males and females in the study. It was hoped that there would be an equal representation of males and females among participants; however, females comprised of 63% of participants 9 (n = 36) and males comprised of 37% participants (n = 21).

Potential threats to internal validity were also considered in this research study (Lund Research, 2012). Stress levels were not only subjective, but stress also had a tendency to wax and wane over time, sometimes even in a day. Therefore, the time of day in which the data were collected may have been a threat to validity. For example, parking spaces may have been easier or harder to find the morning hours of this study, thereby it was possible acute stress levels increased or decreased throughout the day, which may have affected the receptiveness to treatment methods, thereby affecting results.

The construct of mindfulness was considered as a potential threat to validity. To reduce the threat to validity, it was important the environments of the control and treatment groups were arranged in similar fashion with seating, lighting, temperature of the room, volume of the binaural beats, and even the rate and tone of the facilitators' speech. Fortunately, the current research study used sample randomization measuring levels of stress, both through pre and posttest scores, between control and treatment groups, so it was unlikely there was interference with posttest findings. The length of the study between control and treatment groups were commensurate, so internal validity was not threatened among the two groups and maturation effects were also not a threat to validity since the data collection occurred in the span of approximately 1 hour. The most significant internal threat to validity remained in the results of the control group, postintervention. Although the control group did not participate in the brief mindfulness intervention, the participants were aware there was *some* intervention taking place in between the pre and posttest BSI. Control group participants' belief there was exposure to

an intervention and their opportunity to participate in 15 minutes of unstructured relaxation time may have been a threat to internal validity.

Ethical Considerations

In research, potential ethical concerns were important to address in order to minimize risk to participants and ensure best ethical practices. According to the Department of Health and Human Services (1993) the expected benefits of the research should outweigh the potential harm or discomfort to participants. Risk was defined as the chance of physical, psychological, social, or economic harm due to participation in the research study (Department of Health and Human Services, 1993). Consideration was given to identify possible effects on consenting individuals as a result of participating in this study. Informed consent and participant protection were influential throughout the study. The potential clinical ramifications were considered utilizing the BSI, therefore, the dimensions of psychoticism, paranoid ideation, hostility, and interpersonal sensitivity were not used (DeRogatis, 1993). Additionally, in order to limit professional liability and potential liabilities to the sponsoring institution, the statement regarding potential suicidality was also omitted from the dimension of depression on the BSI in the current study. It was not the intent of the study to examine suicidal ideations, levels of paranoia, levels of interpersonal sensitivity, levels of phobic anxiety, or hostility. Confidentiality was provided to participants, as participants were randomly assigned numbers, in lieu of using their name or other self-identifying markers, other than gender, classification, and age. Group facilitators were both licensed under the Texas State Board of Examiners of Psychologists with Independent Practice, therefore they fall under the Rules of Practice in

Conducting Research (Texas State Board of Examiners of Psychologists §§465.20), while both had a breadth of clinical knowledge in assessments and evaluations, as well as mindfulness techniques.

All participants were provided the contact information for the College's counseling center, where licensed therapists are available for mental health intervention, should the need arise. Additionally, referral information was provided to all participants for the local mental health clinic and the community indigent health clinic, which provide free and reduced mental health treatment. Individual confidentiality was ensured, with limits of confidentiality pursuant to the Texas State Board of Psychological Examiner's Code of Ethics, Subchapter C. Participants did not provide their names and were assigned a participant number at the initial meeting; however, if a participant approached the facilitators after the session, to discuss mental health concerns in more detail, this would have been on their own accord and a referral would have been provided immediately.

A major ethical concern was eliminating the participation of vulnerable populations. Minors were considered a vulnerable population, which was a possibility within the target sample of first-year college students. Individuals, over the age of 18 were recruited to participate. This eliminated the need to get permission from the minors' parents to participate in the study. Confidentiality was ensured to each participant and was explained to participants on the informed consent form and in person. Their individual scores on the BSI or WMS-IV were not disclosed to any third party. Limits to confidentiality were considered and potential circumstances to breach confidentiality were revealed to participants, such as expressed suicidal ideation.

Data was collected and stored by the primary facilitator. This data has been kept in a locked file cabinet, in the facilitator's office, behind a locked office door. This paper data will be kept for five years at which time it will be shredded. Data analysis has been kept on the facilitator's personal computer, which is protected by password authentication.

Another potential ethical issue was to ensure participants did not feel coerced to participate in the study in the hopes of secondary gains. Miller (2010) suggested the removal of secondary gains in assessment situations, such as litigation and money, which yielded a substantial drop in rates of malingering, which suggested only a marginal probability of malingering among individuals in the current study. This study did not provide participants with considerable secondary gains: no cash value, no school credit, so it was probable that rates of malingering were nil. The issue of feigning and poor performance was mostly eliminated since it was a voluntary study. Participants did not *have* to participate unless they wanted to, so it was expected participants exerted their best effort.

The overall risks of the study were minimal and substantial efforts were implemented to ensure reduction of risk. At the close of data collection, debriefing was provided to all participants, at which time they had the opportunity to participate in brief mindfulness meditation, so even those participants in the control group had the benefit of knowing the techniques.

Summary

This chapter presented and discussed research methods for the current quantitative study which examined the main effects of distress and memory, with the implementation of brief mindfulness meditation. This chapter provided a description of the research design, sampling methods, instrumentation, data collection, steps for data analysis, as well as ethical considerations of the study. Reliability and validity measures were discussed for the two instruments used, the BSI and WMS-IV. Care was taken to ensure vulnerable populations would not be part of the study and other possible ethical considerations were thoroughly examined to ensure the protection of participants. The following chapter will provide a review of results from analyzed secondary data and statistical outcomes of the study.

Chapter 4: Results

Introduction

This study examined the effectiveness of employing 15 minutes of brief mindfulness meditation, using diaphragmatic breathing and sitting meditation on levels of perceived distress and memory recall, among community college students immediately prior to learning new material.

This chapter includes the findings for the three research questions through an examination of the collected data, which included pre and posttest GSI scores obtained from 4 dimensions (somatization, obsessive-compulsive, depression, and anxiety) of the BSI and subtest scores (Logical Memory I and II and Visual Reproduction I and II) on the WMS-IV. Data collection and the analysis of data were explained in Chapter 3. A descriptive analysis of the approach used to analyze data will be presented in Chapter 4, as well as the data findings that will answer each research question posed.

Data Collection

Data were collected at a 2-year community college in the Houston metroplex. Recruitment efforts consisted of flyer postings in the campus Student Center, Learning Lab, Library, and department boards for first-year community college students. The data were collected on campus, at a one-time event on a Wednesday morning during the Fall semester. Data were collected uniformly, using a script and there was no deviation from the data collection plan presented in Chapter 3. Participants were given a pretest BSI. The treatment group then participated for 15 minutes in the brief mindfulness intervention of diaphragmatic breathing and sitting meditation, while the control group participated in 15

minutes of quiet time. The participants were then given a posttest BSI. Participants were given the Logical Memory I and II, as well as Visual Reproduction I and II subtests of the WMS-IV following but not prior to the intervention. No discrepancies occurred during data collection from the data collection plan presented in Chapter 3. The data were collected in 1 hour and 5 minutes. Over the subsequent 2 weeks, I scored the data according to testing administration manuals (see DeRogatis, 1993; Wechsler, 2009).

Treatment and Intervention Fidelity

The treatment was administered using standardized interventions described in Chapter 3. The facilitators had detailed instructions and a script, with each component of data collection prepared and clearly labeled. These standardized instructions ensured consistency with the intervention and promoted fidelity by minimizing possible differences between each facilitators' approach. The data collection rooms each had accessible lights for dimming, as well as access to multimedia, including PowerPoint and audio. There were no challenges or adverse events associated with the treatment or data collection.

Results

All 57 participants provided usable data for this study. I cleaned the data before entering the information into the dataset, which was verified for accuracy by reviewing all data points entered. In order to analyze and translate the data, I used multiple methods: descriptive statistics, means, correlations, ANCOVA, MANOVA, and *t* test analysis.

Descriptive statistics were used to organize data and show specifics regarding the distribution of age among participants, gender, and participant numbers in treatment and

control groups (Lund Research, 2018). Statistical Package for Social Sciences (SPSS), version 25, was used as the data analysis tool. Using descriptive statistics, as well as means, correlations, ANCOVA, MANOVA, and *t* test analysis, collected data were examined in order to answer the research questions.

While multiple regression was the analysis technique expected to be used for data analysis, correlation analysis revealed that age and gender were not correlated with any other variables. ANCOVA was used as a way to remove the possible effects of the covariate, pretest BSI scores on the variance of the posttest BSI scores in each independent group. An independent *t* test was used to examine the groups (treatment and control) represented the independent categorical variable, as a means of association with the memory subscales. An independent *t* test was used to examine means among the memory subscales and the covariates of age and gender. I used MANOVA to examine the memory subscale scores simultaneously in the treatment and control groups. Scaled scores on the Logical Memory I and II and Visual Reproduction I and II WMS-IV subtests were examined as dependent continuous variables in a correlation matrix with MBSR as the independent variable.

Descriptive Statistics

G*Power Analysis 3.1 confirmed the target sample size of 55 with medium effect size, and 0.05 level of significance for a type I error at 80% statistical power using test family *t* test, linear multiple regression: Fixed model, single regression coefficient and using test family *F*-tests linear multiple regression: Fixed model, R^2 increase, and a priori power analysis, which was further supported by Faul et al. (2009). The actual sample size

was slightly larger with 59 students; however, two of these students were under the age of 18 and therefore were dismissed from the study during the collection of demographic information. A total of 57 students ($N = 57$) participated in the study and their data were analyzed to answer the research questions. The participant group consisted of 36.8% males ($n = 21$) and 63.2% females ($n = 36$). Based on figures from 2013 U.S. News and World Report, 42% of the student body were males and 58% were females, which is rather commensurate with the gender distribution of the sample group. The average age of participants was 19.58 years ($SD = 2.53$). The age of participants ranged from 18 to 32 years. Of the participants, 80.7% were 18 to 20 years of age, 14.1% were 21 to 24 years of age, and 5.4% were aged 26 and older. All participants were first-year students. The treatment group comprised of 29 participants and the control group comprised of 28 participants. According to correlations, the treatment group ($n = 29$, $p = .17$) and control group ($n = 28$, $p = .20$) did not differ statistically for age or gender. Tables 3, 4, 5, and 6 depict gender and age distribution of participants.

Table 3

Descriptions for Summative Means (M) and Standard Deviation (SD) for Age and Gender Among Treatment and Control Groups (N = 57)

	M	*SD*
Gender	1.59	.50
Treatment (n = 29)		
Male (n = 12)		
Female (n = 17)		
Gender Control (n = 28)	1.68	.48
Male (n = 9)		
Female (n = 19)		
Age		
Treatment (n = 29)	19.97	2.78
Age Control (n = 28)	19.18	2.12

Table 4

Bivarate Correlation of Gender and Age in Treatment Group (n = 29)

	Gender	Age
Gender		
Pearson	1	.17
Sig. 2-tailed		.38
Age		
Pearson	.17	1
Sig. 2-tailed	.38	

Table 5

Bivarate Correlation of Gender and Age in Control Group (n = 28)

	Gender	Age
Gender		
Pearson	1	.20
Sig. 2-tailed		.31
Age		
Pearson	.20	1
Sig. 2-tailed	.31	

Table 6

Age Distribution of Participants (N = 57)

Years	Number of Participants (*n*)	Percent
18	22	38.6
19	19	33.3
20	5	8.8
21	4	7.0
22	3	5.3
24	1	1.8
26	1	1.8
27	1	1.8
32	1	1.8

Levels of distress were decreased when comparing pre and posttest scores in both treatment (*M* GSI pretest = 65.76, *M* GSI posttest = 59.28) and control groups (*M* GSI pretest = 62.50, *M* GSI posttest = 56.00), but the between-group differences were not significant.

Brief Symptom Inventory (BSI)

The BSI allowed participants to self-rate levels of distress using a 0 through 4 Likert scale on 24 items, which measured 4 dimensions: somatization, obsessive-compulsive, depression, and anxiety. The Likert scores were tallied, and the total number

of scores was divided by the total number of items. This score yielded a raw score for the GSI. The BSI conversion chart was then used and normed for a non-patient population according to gender, which converted raw scores to *t* scores. A total GSI t-score on the BSI of 63 or greater was considered significantly distressed. Figure J1 (Appendix J1) depicts BSI pre and postscores for treatment group and Figure J2 (Appendix J2) depicts BSI pre and postscores as GSI scores for control group. As seen in Table 7, standard deviations were examined for pretest BSI mean scores, as well as testing for difference between the treatment and control groups.

Table 7.

Comparing Differences, Summative Means (M), and Standard Deviation (SD) for Pretest BSI Scores Among Treatment and Control Groups with Univariate Analysis of Variance and Levene's Test for Equality of Variances (N = number of participants)

	N	*M*	*SD*
Treatment Group	29	65.76	7.67
Control Group	28	62.50	10.45
Total	57	64.16	9.21

t = 1.35, Sig. = 0.60

Wechsler Memory Scale-IV (WMS-IV)

The WMS-IV was used to assess the memory function of participants by examining logical memory and visual reproduction in 4 subtests: Logical Memory I, Visual Reproduction I, Logical Memory II, and Visual Reproduction II. Raw data were

scored according the testing administration manual (see Wechsler, 2009) and converted to scaled scores, which were normed per age, according to the testing administration manual. Subtest scaled scores ranged from 2 to 19 with a mean of 10, and percentile rank was based on scaled scores (see Wechsler, 2009). Figure J3 (Appendix J3) represents WMS-IV reporting and descriptors of scores of treatment and control group scores for 4 subsets: Logical Memory I (LMI), Visual Reproduction I (VRI), Logical Memory II (LMII) and Visual Reproduction II (VRII). Figure J3 represents WMS-IV reporting and descriptors of scores with the control group scores for the 4 subsets LMI, VRI, LMII, and VRII. WMS-IV Scores for treatment (n = 29) and control (n = 28) groups for subtests LMI, VRI, LMII, and VRII. Raw scores were grouped into Low, Avg, and High/Superior ranges. Extremely Low to Low scores = raw score 2-7; Avg scores = raw score 8-11; High Avg/Superior scores = raw scores 12-15. Visual Reproduction II represented the only significant change between treatment and control groups (p = .008, p < .05). Pearson correlation matrix (Table 8) indicated there was a statistically significant correlation between Logical Memory I and Logical Memory II (r = .87, p < .01), Visual Reproduction I and Visual Reproduction II (r = .51, p < .01), and Visual Reproduction II and Logical Memory II (r = .43, p < .01) among all participants.

Table 8.

Pearson (r) Correlation Matrix of WMS Subscales LMI, VRI, LMII, and VRII (N = 57)

	LMI	VRI	LMII	VRII
LMI				
r	1	.19	.87**	.29*
Sig. (2-tailed)		.16	.00	.03
VRI				
r	.19	1	.25	.51**
Sig. (2-tailed)	.16		.06	.00
LMII				
r	.87**	.25	1	.43**
Sig. (2-tailed)	.00	.06		.00
VRII				
r	.29*	.51**	.43**	1
Sig. (2-tailed)	.029	.00	.00	

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

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

Research Questions

RQ1. Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) lower levels of distress in a treatment group?

$H_0$1. Exposure to a brief mindfulness intervention has no effect on levels of distress among the treatment group when compared to no treatment controls.

H_a1. Exposure to a brief mindfulness intervention lowers levels of distress among the treatment group when compared to no treatment controls.

.In order to examine RQ1, a one-way Analysis of Covariance (ANCOVA) was conducted to compare the effectiveness of brief mindfulness while controlling for levels of distress prior to the intervention. Levene's and Shapiro-Wilk were carried out and the assumptions were met. There was no significance in the effect of mindfulness on levels of distress after controlling for the effect of levels of preintervention distress [$F(1, 54) = .01$, $p = .92$]. Comparing the estimated marginal means showed that the posttest BSI scores in the treatment group (mean = 57.75) and in the control group (mean = 57.58) were commensurate. Thus, the null hypothesis was not rejected. The covariate, levels of preintervention distress (pretest BSI scores), were significantly related to the participants' postintervention levels of distress [$F(1, 54) = 109.47$, $p = .00$. All significant values are reported at $p < .05$.

RQ2. Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) improve memory function in a treatment group?

$H_0$2. Exposure to a brief mindfulness intervention has no effect on memory function among the treatment group when compared to no treatment controls.

H_a2. Exposure to a brief mindfulness intervention improves memory function among the treatment group when compared to no treatment controls.

In order to examine RQ2, differences between treatment group and control groups on scaled scores on Logical Memory I (LMI), Visual Reproduction I (VRI), Logical Memory II (LMII), and Visual Reproduction II (VRII) postintervention were examined. Table 9 reveals mean scaled scores in treatment and control groups. As demonstrated on Table 9, the treatment group showed higher mean scores in Visual Reproduction II following the intervention. Differences in the other memory indices were not statistically significant. Utilizing a MANOVA for further validation of conclusions, when examining memory subscale scores, the MANOVA revealed a non-significant multivariate main effect for MBSR group (treatment and/or control), Wilks' $\lambda = .78$, $F(4, 52) = 3.69$, $p > .001$, partial η^2 .22. Power to detect the effect was .85. However, a statistically significant difference in the dependent variables of memory subtests were found based on the independent variable of MBSR (treatment and control groups) ($p < .05$), as seen on Table 10. As indicated in Table 11, Visual Reproduction II was found to be significant ($F(1, 55) = 7.77$; $p < .05$; partial $\eta^2 = .124$). Commensurate with independent samples *t* test, as seen on Table 8, the MANOVA (Table 10) also determined MBSR did not have any significant effect on LMI ($F(1, 55) = .29$; $p > .05$; partial $\eta^2 = .005$), VRI ($F(1, 55) = .40$; $p > .05$; partial $\eta^2 = .007$), or LMII ($F(1, 55) = .52$; $p > .05$; partial $\eta^2 = .009$).

Table 9.

Mean Scaled Scores in Treatment versus Control Group Independent Samples T Test

	Treatment Group (n = 29)	Control Group (n = 28)	*T*	Sig. (2-tailed)
LMI	8.79	9.11	- 0.54	.20
VRI	7.90	7.50	.63	.49
LMII	9.41	9.79	- .72	.74
VRII	10.69	9.18	2.79	.11

Table 10.

Multivariate Test of Mean Scaled Scores Between Treatment Group and Control Group

Effect		Sig.	Partial Eta Squared
MBSR	Wilks' Lambda	.010	.22

Table 11.

Tests of Between-Subjects Effects to Determine Significance of MBSR as Dependent Variable

Effect		*Df*	Mean Square	*F*	Sig.	Partial Eta Squared
MBSR	LMI	1	1.41	.29	.59	.005
	VRI	1	2.24	.40	.53	.007
	LMII	1	1.97	.52	.48	.009
	VRII	1	32.53	7.77	.007	.124

RQ3. Do changes in perceived levels of distress mediate the effects of exposure to mindfulness on memory function?

$H_0$3. Changes in perceived levels of distress do not mediate the effects of exposure to mindfulness on memory.

H_a3. Changes in perceived levels of distress mediate the effects of the exposure to mindfulness on memory

In order to answer RQ3, a test for mediation was considered, however, there was no need to test for mediation as there was no main effect, which failed to reject the null hypothesis.

Summary

The data findings indicated there was no statistically significant difference in levels of distress between the treatment and control groups. Distress levels decreased in both groups when comparing posttest BSI scores to the baseline, after the 15 minutes of MBSR for the treatment group and after the 15 minutes of unregulated relaxation for the control group. When examining memory function, there was a statistically significant difference in scores on Visual Reproduction II between the treatment and control groups, indicating higher abilities of delayed visual memory in participants of the treatment group. Chapter 5 will examine the implications of these findings, as well as recommendations for further research into distress levels, the use of relaxation techniques, and memory within a classroom setting.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative field study was to examine if brief mindfulness affected levels of distress among first-year community college students. This study also examined whether using brief mindfulness techniques affected memory functions. Moreover, I examined if changes in distress levels, before and after mindfulness exposure, were associated with memory improvement. Also included is a discussion of findings and how these findings relate to existing literature on the memory function, mindfulness, and distress, as well as how CAT (Reme et al., 2008) and Baddeley and Hitch's theory of working memory (Baddeley & Hitch, 1974) associate with these findings. This chapter concludes with limitations of the study, recommendations for further research, implications for social change, and a final synopsis.

This chapter provides discussion and suggestions for future research studies to help answer the following research questions:

RQ1: Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) lower levels of distress in a treatment group?

RQ2: Does the intervention of brief mindfulness (diaphragmatic breathing and sitting meditation) improve memory function in a treatment group?

RQ3: Do changes in levels of distress mediate the effects of exposure to mindfulness on memory function?

Findings indicated that levels of distress in both groups, treatment and control, decreased when comparing pre and posttest BSI scores. However, there was not a

statistically significant difference between the group exposed to brief mindfulness and the group that was not. Memory function, logical memory, and visual reproduction were also examined between treatment and control groups. No significant differences in memory indices were identified between the groups, except for higher-scaled scores in delayed visual reproduction among the treatment group.

Interpretation of the Findings

An extensive review of existing literature established college students encounter high levels of perceived distress (American College Health Association, 2011; American Psychological Association, 2013; Compas et al., 2001; Conley et al., 2013; Marin et al., 2011; Leppink et al., 2016; Milojevic & Lukowski, 2016; Tugend, 2017; Watson & Pennebaker, 1989; Welle & Graff, 2011). The findings of the current research study echoed previous findings in literature, as student participants reported high levels of distress at baseline, overall.

A review of literature found the implementation of in-class stress reduction, specifically MBSR, lowered levels of distress in students (Aherne et al., 2016; Erogul et al., 2014; Halland et al., 2015; Rosenzweig et al., 2003; Schonert-Reichl et al., 2015; Schwind et al., 2017; Sibinga et al., 2011). Another study by LeBlanc (2016) also studied the effectiveness of in-class stress reduction techniques among students, but this study did not specify MBSR as the modality of intervention. I found levels of student distress decreased from the baseline pretest BSI scores to posttest BSI scores following the 15 minutes intervention for the treatment group and 15 minutes of unstructured down-time for the control group. While differences between pre and posttest BSI scores were not

statistically significant between treatment and control group, it is important to note levels of an overall decrease in the levels of perceived distress among participants when comparing to the baseline.

Although there was no significant difference between treatment and control group from baseline BSI scores to the reduction of posttest BSI scores, students aged 26 and above (n = 3, 5% of sample) demonstrated significant reduction in perceived distress when comparing BSI pretest scores to posttest scores. The control group results of participants aged 26 and above (n = 2) had similar findings. These findings may indicate more responsiveness to stress reduction techniques, even passive stress reduction in the form of in-class downtime, within a nontraditional (i.e., older) student population. As Garner and Barefoot (2012) contend, nontraditional students may encounter additional stressors than the traditional college student, such as work and family responsibilities. Therefore, as the current study suggests, nontraditional students demonstrated greater sensitivity to the effects of in-class stress reduction, both directed stress reduction techniques and independent downtime.

RQ2 sought to determine if the intervention of brief mindfulness, specifically diaphragmatic breathing and sitting meditation, improved memory function within the treatment group. While I did not find overall significance with RQ2, certain areas within analysis revealed statistical significance when isolating the specific subtest of Visual Reproduction II. Findings of the current study discovered higher memory scores in the treatment group following the intervention when compared to the control group. This confirmed higher abilities of delayed visual memory in the treatment group,

postintervention, when compared to the control group. Within treatment and control groups, both Logical Memory I and Logical Memory II were highly correlated. Visual Memory I and Visual Memory II were significantly correlated. Logical Memory II and Visual Reproduction II were significantly correlated. Less correlated, but significant to mention was the correlation of Logical Memory I and Visual Reproduction II. These correlations agree with Boutet et al. (2007), Dolcos et al. (2005), Joels et al. (2006), McEwen (2007), Newcomer et al. (1999), and Vogel and Schwabe (2016) that different types of memory were correlated with immediate memory and the process of effective encoding can be hampered by distress, which also substantiates Baddeley and Hitch's (1974) theory of working memory (1974) and the concept of attentional load effects on memory function.

In the current study, levels of distress decreased 10% among students in the control group when compared to pre and posttest BSI scores. An expected stress reducing factor was being deployed, even in the control group for 15 minutes. Participants were cued to relax, put their pens down, blinds were drawn, soothing music was played, all of which provided elements of expectation of a stress reducing mechanism. According to the CATS (Reme et al., 2008), the decrease in levels of perceived distress, even in the control group, were not surprising due to coping expectancy. Since both groups, treatment and control, participated in brief stress reduction (structured diaphragmatic breathing and sitting meditation for the treatment group and 15 minutes of down-time within the control group), the environment of the control group was conducive to anticipatory stress reduction as suggested by CATS.

Limitations of the Study

College students are one of the most stressed population groups (American Psychological Association, 2013; Conley et al. 2013; Tugend, 2017; Vaez & LaFlamme, 2008; Welle & Graf, 2011), while community college students were found to have even higher stress levels when compared to university students (Inceptia, 2013; Ryan, 2009; Zeidenberg, 2008). The findings of the current study echoed the sentiments of previous literature with the current sample of participants which indicated clinically significant levels of perceived distress (DeRogatis, 1993). While the findings of the current study were commensurate with previous literature indicating community college students' evidence high levels of perceived distress, the following limitations in the study are noteworthy to explore in further depth. These include a relatively small sample size, possible non-representativeness of the sample, instrumentation and a control group that may have already been stress reducing.

The sample size for F-tests linear multiple regression: fixed model, R^2 increase, and a priori power analysis, with a medium effect size, 0.05 level of significance for a Type I error at 80% statistical power was set for 55 participants (Faul et al., 2009). The sample size consisted of 57 participants. While this sample met the recommendation based on the power analysis, it is possible that effect size may have been less than expected, which could have resulted in insufficient statistical power.

The participant sample consisted of first-year community college students from a specific area in the Texas Gulf Coast region; as a result, this sample may not represent the same stressors of students in other regions. The sample was drawn from participants in a

community college setting and cannot be generalized to all college students because the sample did not represent continuing year students, or bachelor and graduate degree seeking students and only represented beginning students.

The study also did not collect data regarding premorbid conditions of participants, including mental and medical health diagnoses, which may have been aggravating factors to increased levels of distress.

In the current study, the choice of instrumentation may have introduced some limitations. The WMS-IV (Wechsler, 2009) is an assessment tool, which requires auditory and visual abilities, as well as fine motor skills, such as grasping a pencil in order to draw visual designs. This testing instrument limited participation to individuals who had adequate auditory and visual abilities to attend to the subtests, as well as, fine motor skills in order to draw visual details.

Finally, a potential limitation was cuing the control group and allowing the 15 minutes of down time. If the control group had not been given any time to destress prior to the memory tests, the differences in the results of the treatment and control groups may have been markedly different.

Recommendations

A review of findings from the current study, including limitations, found several areas which could further contribute to the analysis of stress reduction techniques in a college setting and memory function. Suggestions include using a larger sample size and expanding the targeted sample to include students in community colleges and universities in other geographical areas, as well as continuing year college students in bachelors and

graduate degree programs. Future research could also focus on distress among nontraditional students and targeted implementation of stress reduction techniques for this population in college settings.

While a quantitative research design provided empirical data that determined memory levels across the domains of logical memory and visual reproduction, as well as the BSI scores that provided a statistically sound method for determining levels of perceived distress, a mixed methods design would have allowed participants to provide further information, such as possible premorbid diagnoses, types of stress encountered, existing stress reduction techniques they may be using, and levels of social support. In addition, while the instruments used in the current study (WMS-IV and BSI) had merit, other measures of stress, such as salivary cortisol may have been informative (Schonert-Reichl et al., 2015). A future study should consider the use of a longitudinal design which, would provide brief intervention to a treatment group over a longer period which may be of greater benefit to participants.

In the current study, both groups, treatment and control, received 15 minutes of environmental decompressing activities prior to measuring levels of distress on posttest BSI and memory functions. This begs the question of whether the results of the active control group may have been different if the group was not provided any destressing environmental activities. In a future study, it is recommended to have a control group that is not exposed to a destressing environment (e.g., keeping lights on). This may help to determine if simply providing the 15 minutes of downtime, as was afforded to the control

group of the current study prior to learning new material, reduces levels of distress and improves memory function even more.

Implications

The current study postulates the benefit of lowering levels of distress in college students, thereby positively impacting the welfare of the individual student(s) including learning outcomes, higher retention rates, and improved physical and mental well-being (Gross et al., 2009; Pierceall & Keim, 2007). While college enrollment rates have quadrupled since 2000, only a third of these individuals obtain a bachelor's degree (Ryan & Bauman, 2016; U.S. Department of Education's National Center for Education Statistics, 2017) and half of all enrolled college students in the United States are attending community college (Zeidenberg, 2008). According to Zeidnberg (2008), community college students have lower degree completion rates than university students. A survey of first-year college students by Inceptia (2013) reported community college students had higher levels of distress than university students, endorsing additional stressors, such as working more hours per week, enrollment in a greater number of remediation classes, and higher incidence of providing for a family, just to name a few.

An exhaustive review of literature indicates higher levels of distress are negatively associated with memory functioning (Baumeister et al., 2003; Vaez & LaFlamme, 2008). Research also asserts college students are highly stressed (American Psychological Association, 2013; Conley et al., 2013; Welle & Graf, 2011) and results from this study are consistent with these previous findings as participants indicated high levels of distress. Pierceall and Keim (2007) found academic demands were the highest

source of stress among college students while Ryan (2009) found daily hassles that students felt were out of their control were a large contributor to higher levels of distress. Research studies have indicated higher levels of stress are negatively associated with academic performance (Arsenio & Loria, 2014; Vaez & LaFlamme, 2008).

When considering high levels of stress and educational outcomes, memory functioning must be considered as one of the foundational blocks to effective learning processes. Commensurate with Baddeley and Hitch's theory of working memory (1974), the cognitive development of memory functioning involves neurological processes of attention, encoding, retrieval, which can all be compromised by stress loads (Boutet et al., 2007; Bremner et al., 2000; Hozel et al., 2010; Kirschbaum et al., 1996; Nauret, 2008; Newcomer et al., 1999; Vogel & Schwabe, 2016). Since research contends stress negatively affects memory and college students are a particularly stressed group, the cognitive activation theory of stress (Ursin & Erikson, 2004) provides support to employing stress reduction techniques in a classroom setting as a means to better manage levels of distress among college students to increase levels of self-efficacy. Interventions, such as MBSR have been found to reduce levels of distress and students who manage stressors effectively, have better outcomes (Baghurst and Kelley, 2014; D'Abundo et al., 2016; Holzel et al., 2010; LeBlanc, 2016; Mrazek et al., 2013; Oman et al., 2008).

Better management of stress may contribute to improved student learning outcomes. Institutions who support the use of in-class stress reduction techniques can be instrumental in providing enhanced learning environments that take into account the entirety of the student and their experiences including sensitivity to stress levels and their

potential impact on academic performance (Bamber & Schneider, 2016; Beiter et al., 2015; Lin & Huang, 2014; Roberts et al., 2011; Shankar & Park, 2016). The consequence of providing a supportive learning environment to college students by utilizing in-class stress reduction opportunities, either structured or unstructured, can positively impact the individual lives of students by creating habits of mindfulness which may in turn support students in increasing emotional self-regulation, lessening mood dysregulation, improving physical health, and increasing attention and concentration (see Gross et al., 2009; Schonert-Reichl et al., 2015). As individuals are impacted, the systemic changes may in turn positively impact the climate of the campus, including lower attrition rates (see Ryan & Bauman, 2016), higher levels of graduates, as well as societal impacts of higher individual earning potential which in turn produces greater economic stability (see Raniseski, 2014).

Conclusion

While numerous studies have attested to the benefits of MBSR and other stress reduction methods to lower levels of distress (see Aherne et al., 2016; Baghurst & Kelley, 2014; D'Abundo et al., 2016; Erogul et al., 2014; Halland et al., 2015; Holzel et al., 2010; Lamkin & Slavich, 2014; LeBlanc, 2016; Mrazek et al., 2013; Oman et al., 2008; Rosenzweig et al., 2003; Schonert-Reichl et al., 2015; Sibinga et al., 2011; Tacon, 2003), the literature review failed to identify studies examining whether lowering levels of distress in college students by utilizing brief mindfulness techniques could potential impact memory function. Since stress negatively impacts memory (Dolcos, LaBar, & Cabeza, 2005; LeBlanc, 2009; Nauret, 2008; Vogel & Schwabe, 2016; Shi & Liu, 2016)

and memory is vital to learning processes (Boutet et al., 2007), and college students continue reporting high levels of distress, as evidenced in the current study, it is imperative colleges implement interventions to assist students in better managing levels of distress. In the current study, I found positive correlations between the ability to recall visual and verbal materials on a delay in both the treatment and control groups, as both groups were exposed to 15 minutes of relaxation, albeit unstructured relaxation in the control group. These findings coincide with Baddeley and Hitch's theory of working memory (1974), which asserts the importance of controlling for stress and attentional overload in order to maximize encoding processes. Since college students have been identified as a highly stressed population (see American Psychological Association, 2013; Conley et al., 2013; Tugend, 2017; Welle & Graf, 2011), for which the current study is in agreement, the findings of this study contribute to positive social change by providing further research and implications regarding high levels of distress among community college students. In addition, the findings of this study support the importance of implementing brief stress reduction opportunities in a classroom setting, whether structured stress reduction, such as MBSR, or undirected down-time, as a means to encourage healthy coping measures in handling stress, thereby improving memory and the projection of improving physical and mental well-being, as well as, educational outcomes.

References

Aherne, D., Farrant, K., Hickey, L., Hickey, E., McGrath, L., & McGrath, D. (2016). Mindfulness-based stress reduction for medical students: Optimising student satisfaction and engagement. *BMC Medical Education, 16*(209), 1-11. doi: 10.1186/s12909-016-0728-8

Albrecht, N. J., Albrecht, P. M., & Cohen, M. (2012). Mindfully teaching in the classroom: A literature review. *Australian Journal of Teacher Education, 37*(12), 1-14. doi: 10.14221/ajte.2012v37n12.2

Allen, R. J., Hitch, G. J., Mate, J., & Baddeley, A. D. (2012). Feature binding and attention in working memory: A resolution of previous contradictory findings. *Quarterly Journal of Experimental Psychology, 65*(12), 2369-2383. doi: 10.1080/17470218.2012.687384

American College Health Association. (2011). American College Health Association-National College Health Assessment II: Reference group data report Spring 2011. Retrieved from http://www.acha-ncha.org/docs/ACHA-NCHAII_ReferenceGroup_ExecutiveSummary_Fall2011.pdf

American Psychological Association. (2018). Stress effects on the body. Retrieved from http://www.apa.org/helpcenter/stress-body.aspx

American Psychological Association. (2013). Stress in America: Missing the health care connection. Retrieved from https://www.apa.org/news/press/releases/stress/2012/full-report.pdf

Anderson, R. M., Birnie, A. K., Koblesky, N. K., Romig-Martin, S. A., & Radley, J. J. (2014). Adrenocortical status predicts the dress of age-related deficits in prefrontal structural plasticity and working memory. *Journal of Neuroscience, 34*(25), 8387-8397. doi:10.1523/JNEUROSCI.1385-14.2014

Aronen, E. T., Vuontela, V., Steenari, M.-R., Salmi, J., & Carlson, S. (2005). Working memory, psychiatric symptoms, and academic performance at school. *Neurobiology of Learning and Memory, 83*, 33-42. doi: 10.1016/j.nlm.2004.06.010

Arsenio, W. F. & Loria, S. (2014). Coping with negative emotions: Connections with adolescents' academic performance and stress. *Journal of Genetic Psychology, 175*(1), 76-90. doi:10.1080/00221325.2013.806293

Associated Press Survey. (March 2008). Edison media research study. Retrieved from http://cdn.halfofus.com/wp-content/uploads/2013/10/mtvU-AP-College-Stress-and-Mental-Health-Poll-Full-Version.pdf

Audio Binaural Beats. (2014, April 08). 15 minute intense chakra activation meditation (Binaural Beats and Isochronic Tones) [video file]. Retrieved from https://www.youtube.com/watch?v=kB4qohP35iM

Baddeley, A. D., & Hitch, G. (1974). Working memory. *Psychology of Learning and Motivation, 8*, 47-89. doi:10.1016/S0079-7421(08)60452-1

Baghurst, T. & Kelley, B. C. (2014). An examination of stress in college students over the course of a semester. *Health Promotion Practice, 15*(3), 438-447. doi:10.1177/1524839913510316

Bamber, M. & Schneider, J. (2015). Mindfulness-based meditation to decrease stress and anxiety in college students: A narrative synthesis of the research. *Educational Research Review 18*, 1-32. doi:10.1016/j.edurev.2015.12.004

Bamuhair, S. S., Al Farhan, A. I., Althubaiti, A., Agha, S., Rahman, S., & Ibrahim, N. O. (2015). Sources of stress and coping strategies among undergraduate medical students enrolled in a problem-based learning curriculum. *Journal of Biomedical Education, 2015*, 1-8. doi:10.1155/2015/575139

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest, 4*(1), 1-46. doi: 10.1111/1529-1006.01431

Beiter, R., Nash, R., McCrady, M., Rhoades, D., Linscomb, M., Clarahan, M., & Sammut, S. (2015). The prevalence and correlates of depression, anxiety, and stress in a sample of college students. *Journal of Affective Disorders, 1*(173), 90-96. doi:10.1016/j.jad.2014.10.054

Boutet, I., Milgram, N. W., & Freedman, M. (2007). Cognitive decline and human (Homo sapiens) aging: An investigation using a comparative neuropsychological approach. *Journal of Comparative Psychology, 121*(3), 270-281. doi: 10.1037/0735-7036.121.3.270

Bremner, J. D., Shobe, K. K., & Kihlstrom, J. F. (2000). False memories in women with self-reported childhood sexual abuse: An empirical study. *Psychological Science, 11*(4), 333-337. doi: 10.1111/1467-9280.00266

Burkholder, G. (n.d.). Sample size analysis for quantitative studies. [Class handout]. Walden University.

Butler, G. (1993). Definitions of stress. *Occasional Paper (Royal College of General Practitioners)*, *61*, 1–5. Retrieved from PubMed PMCID: PMC2560943

Cassady, J., & Dacanay, A. (2012). [Test review of Wechsler Memory Scale-Fourth Edition]. In Spies, R. A., Carlson, J.F., and K.F. Geisinger (Eds.), *The eighteenth mental measurements yearbook*. Lincoln, NE: Buros Institute of Mental Measurements. Retrieved from EBSCOhost Database.

Chandra, A., & Batada, A. (2006). Exploring stress and coping among urban African American adolescents: The shifting the lens study. *Preventing Chronic Disease, 3*(2), A40. Retrieved from PubMed PMCIS: PMC1563979

Chang, E. C. (2006). Perfectionism and dimensions of psychological well-being in a college student sample: A test of a stress mediation model. *Journal of Social & Clinical Psychology*, *25*(9), 1001-1022. doi:10.1521/jscp.2006.25.9.1001

Chen, Y., Dube, C. M., Rice, C. J., & Baram, T. Z. (2008). Rapid loss of dendritic spines after stress involves derangement of spine dynamics by corticotropin-releasing hormone. *Journal of Neuroscience, 28*(11), 2903-2911. doi: 10.1523/JNEUROSCI.0225-08.2008

Chittooran, M. M. (2012). [Test review of Wechsler Memory Scale-Fourth Edition]. In Spies, R. A., Carlson, J.F., and K.F. Geisinger (Eds.), *The eighteenth mental measurements yearbook*. Lincoln, NE: Buros Institute of Mental Measurements. Retrieved from EBSCOhost Database.

Christianson, S. A. (1992). Emotional stress and eyewitness memory: A critical review. *Psychological Bulletin, 112*(2), 284-309. doi:10.1037/0033-2909.112.2.284

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H. & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin, 127*(1), 87-127. doi: 10.1037/0033-2909.127.1.87

Conley, C. S., Travers, L. V., Bryant, F. B. (2013). Promoting psychosocial adjustment and stress management in first-year college students: The benefits of engagement in a psychosocial wellness seminar. *Journal of American College Health, 61*(2), 75-86. doi: 10.1080/07448481.2012.754757

Cowan, N. (2014). Working memory underpins cognitive development, learning, and education. *Educational Psychology Review, 26*(2), 197-223. doi:10.1007/s10648-013-9246-y

Crameri, A., Schuetz, C., Andreae, A., Koemeda, M., Schulthess, P., Tschuschke, V., & von Wyl, A. (2016). The Brief Symptom Inventory and the Outcome Questionnaire-45 in the assessment of the outcome quality of mental health interventions. *Hindawi Publishing Corporation Psychiatry Journal, 2016* (7830785). doi: 10.1155/2016/7830785

Croog, S.H., Levine, S., Testa, M. A., Brown, B., Bulpitt, C. J., Jenkins, C. D., . . . & Williams, G. H. (1986). The effects of antihypertensive therapy on the quality of life. *New England Journal of Medicine, 314*(26), 1657-1664. Retrieved from PubMed. PMID: 3520318

D'Abundo, M. L., Sidman, C. L., & Fiala, K. A. (2016). The potential of promoting mindfulness in a university physical activity and wellness course. *International Journal of Adult Vocational Education and Technology, 7*(1), 39-49. doi:10.4018/IJAVET.2016010103

Dalgleish, T. (2004). The emotional brain. *Nature Reviews. Neuroscience, 5*(7), 583-589. doi: 10.1038/nrn1432

Del Prato, D., Bankert, E., Grust, P., & Joseph, J. (2011). Transforming nursing education: a review of stressors and strategies that support students' professional socialization. *Advances in Medical Education and Practice, 2*, 109-116. doi: 10.2147/AMEP.S18359

Department of Health and Human Services. (1993). Institutional review board guidebook. Retrieved from http://www.hhs.gov/ohrp/archive/irb/irb_chapter3.htm

DeRogatis, L.R. (1993). *BSI Brief Symptom Inventory: Administration, Scoring, and Procedure Manual* (4th Ed.). Minneapolis, MN: National Computer Systems.

DeRogatis, L. R. & Cleary, P. A. (1977). Confirmation of the dimensional structure of the scl-90: A study in construct validation. *Journal of Clinical Psychology, 33*(4), 981-989. doi:10.1002/1097-4679(197710)33:4<981::AID-JCLP2270330412>3.0.CO;2-0

Dolcos, F., LaBar, K. S., & Cabeza, R. (2005). Remembering one year later: Role of the amygdala and the medial temporal lobe memory system in retrieving emotional memories. *Proceedings of the National Academy of Sciences, 102*(7), 2626-2631. doi: 10.1073/pnas.0409848102

Erogul, M., Singer, G., McIntyre, T., & Stefanov, D. G. (2014). Abridged mindfulness intervention to support wellness in first-year medical students. *Teaching and Learning in Medicine, 26*(4), 350-356. doi:10.1080/10401334.2014.945025

Fan, L. B., Blumenthal, J. A., Watkins, L. L., & Sherwood, A. (2015). Work and home stress: Associations with anxiety and depression symptoms. *Occupational Medicine, 65*(2), 110-116. doi:10.1093/occmed/kqu181

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests from correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-1160. doi: 10.3758/BRM.41.4.1149

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). London, England: Sage Publications.

Gardner, J. N., & Barefoot, B. O. (2012). *Your college experience: Strategies for success* (10th ed.). Boston, MA: Bedford/St. Martin's.

Green, S. B., & Salkind, N. J. (2014). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (7th ed.) [Kindle DX version]. Retrieved from Amazon.com

Greene, J. & D'Oliveria, M. (2005). *Learning to use statistical tests in psychology* (3rd ed.). Milton Keynes, United Kingdom: Open University Press.

Gropper, R. J., Gotlieb, H., Kronitz, R., & Tannock, R. (2014). Working memory training in college students with ADHD or LD. *Journal of Attention Disorders, 18*(4), 331-345. doi:10.1177/1087054713516490

Gross, C. R., Kreitzer, M. J., Reilly-Spong, M., Winbush, N. Y., Schomaker, E. K., & Thomas, W. (2009). Mindfulness meditation training to reduce symptom distress in transplant patients' rationale, design, and experience with a recycled waitlist. *Clinical Trials, 6*, 76-89. doi: 10.1177/1740774508100982

Halland, E., Vibe, M. D. E., Solhaug, I., Friborg, O., Rosenvinge, J. H., Tyssen, R….Bjorndal, A. (2015). Mindfulness training improves problem-focused coping in psychology and medical students: Results from a randomized controlled trial. *College Student Journal, 49*(3), 387-398. Retrieved from ERIC Database. (EJ1095573)

Harris, K. (2009). Neuropsychological constructs assessed by the Family Pictures subtest. [Dissertation] Retrieved from http://udini.proquest.com/view/neuropsychological-constructs-pqid:1917970131/

Hazan-Liran, B. & Miller, P. (2017). Stroop-like effects in a new code-learning task: A cognitive load theory perspective. *Quarterly Journal of Experimental Psychology,* 70(9), 1878-1891. doi: 10.1080/17470218.2016.1214845

Hershner, S. & Chervin, R. D. (2014). Causes and consequences of sleepiness among college students. *Nature and Science of Sleep, 6*, 73-84. doi: 10.2147/NSS.S62907

Hintz, S., Frazier, P. A., & Meredith, L. (2015). Evaluating an online stress management

intervention for college students. *Journal of Counseling Psychology, 62*(2), 137-147. doi: 10.1037/cou0000014

Hoffman, R. & al'Absi, M. (2004). The effect of acute stress on subsequent neuropsychological test performance. *Archives of Clinical Neuropsychology, 19*(4), 497-506. doi: 10.1016/j.acn.2003.07.005

Holzel, B. K., Carmody, J., Evans, K. C., Hoge, E. A., Dusek, J. A., Morgan, L., … & Lazar, S. W. (2010). Stress reduction correlates with structural changes in the amygdala. *Social Cognitive & Affective Neuroscience, 5*(1), 11-17. doi:10.1093/scan/nsp034

Inceptia. (2013). *Financial Aptitude Analysis* (Brief). Retrieved from https://www.inceptia.org/PDF/Inceptia_FinancialAptitudeAnalysis_researchbrief.pdf

Joels, M., Pu, Z., Wiegert, O., Oitzl, M. S., & Krugers, H. J. (2006). Learning under stress: How does it work? *TRENDS in Cognitive Sciences, 10*(4), 152-158. doi: 10.1016/j.tics.2006.02.002

Kabat-Zinn, J. (2013). *Full catastrophe living: using the wisdom of your body and mind to face stress, pain, and illness* (Revised ed.). New York, New York: Bantam.

Kabat-Zin, J. (2014). Mindfulness-Based Stress Reduction (MBSR) standards of practice. S. F. Santorelli (Ed.). *Center for Mindfulness in Medicine, Health Care & Society University of Massachusetts Medical School*. Retrieved from http://www.umassmed.edu/cfm/mindfulness-based-programs/mbsr-courses/about-mbsr/mbsr-standards-of-practice/

Kar, P. C., Mukhtar, F., Ibrahim, N., Shian-Ling, K., & Sidik, S. M. (2015). Effects of a DVD-delivered mindfulness-based intervention for stress reduction in medical students: A randomized controlled study. *Education in Medicine Journal, 7*(3), 8-20. doi:10.5959/eimj.v7i3.369

Kemeny, M. E. (2003). The psychobiology of stress. *Current Directions in Psychological Science, 12*(4), 124. doi: 10.1111/1467-8721.01246

Kenny, D. A. (2018, January 26). *Mediation*. Retrieved from http://davidakenny.net/cm/mediate.htm

Kerlinger, F. N. & Lee, H. B. (1999). *Foundations of Behavioral Research* (4th ed.). Boston, MA: Cengage Publishing.

Kirschbaum, C., Wolf, O. T., May, M., Wippich, W., & Hellhammer, D. H. (1996). Stress- and treatment-induced elevations of cortisol levels associated with impaired declarative memory in healthy adults. *Life Sciences, 58*(17), 1475-1483. doi: 10.1016/0024-3205(96)00118-X

Lamkin, D. M., & Slavich, G. M. (2014). Psychosocial factors and cancer. In H. L. Miller (Ed.), Encyclopedia of theory in psychology. Thousand Oaks, CA: Sage Publications.

Lane, J. D., Seskevich, J. E., & Pieper, C. F. (2007). Brief meditation training can improve perceived stress and negative mood. *Alternative Therapies in Health and Medicine, 13*(1), 38-44. Retrieved from EBSCOhost Database. PMID: 17283740

Laureate Education, Inc. (2012). *The body's micro-response to stress*. [Class handout]. Walden University.

Lazarus, R. S. & Folkman, S. (1987). Transactional theory and research on emotions and coping. *European Journal of Personality, 1*(3), 141-169. doi: 10.1002/per.2410010304

LeBlanc, V. R., (2009). The effects of acute stress on performance: Implications for health professions education. *Academic Medicine, 84*(10), Supplement, S25-S32. doi: 10.1097/ACM.0b013e3181b37b8f

Leppink, J. (2017). Cognitive load theory: Practical implications and an important challenge. *Journal of Taibah University Medical Sciences, 12*(5), 385-391. doi: 10.1016/j.jtumed.2017.05.003

Leppink, E. W., Odlaug, B. L., Lust, K., Christenson, G., & Grant, J. E. (2016). The young and the stressed: Stress, impulse control, and health in college students. *Journal of Nervous and Mental Disease, 204*(12), 931-938. doi: 10.1097/NMD.0000000000000586

Lin, S. H. & Huang, Y. C. (2014). Life stress and academic burnout. *Active Learning in Higher Education, 15*(1), 77-90. doi: https://doi.org/10.1177/1469787413514651

Lund Research. (2012). Laerd Dissertation. Retrieved from https://dissertation.laerd.com

Lund Research. (2018). Laerd Statistics. Independent t test using SPSS statistics. Retrieved from https://statistics.laerd.com/spss-tutorials/independent-t test-using-spss-statistics.php

Lund Research. (2018). Laerd Statistics. Multiple Regression Analysis using SPSS Statistics. Retrieved from https://statistics.laerd.com/spss-tutorials/multiple-regression-using-spss-statistics.php

Lund Research. (2018). Laerd Statistics. One-way ANOVA in SPSS Statistics. Retrieved from https://statistics.laerd.com/spss-tutorials/ancova-using-spss-statistics.php

Lund Research. (2018). Laerd Statistics. One-way MANOVA in SPSS Statistics. Retrieved from https://statistics.laerd.com/spss-tutorials/one-way-manova-using-spss-statistics.php

Marin, M. F., Lord, C., Andrews, J., Juster, R. P., Sindi, S., Arsenault-Lapierre, G., … & Lupien, S. J. (2011). Chronic stress, cognitive functioning, and mental health. *Neurobiology of Learning and Memory, 96*(4), 583-595. doi: 10.1016/j.nlm.2011.02.016

Marks, D. F., Murray, M., Evans, B., & Estacio, E. V. (2011). *Health psychology: Theory, research, and practice*. (3rd ed.). London, England: Sage Publications

McEwen, B. S. (2007). Physiology and neurobiology of stress and adaptation: Central role of the brain. *Physiological Reviews, 87*(3), 873-904. doi: 10.1152/physrev.00041.2006

McKenzie, S. H. and Harris, M. F. (2013). Understanding the relationship between stress, distress and healthy lifestyle behaviour: A qualitative study of patients and general practitioners. *BMC Family Practice, 14*(166), 1-8. doi: 10.1186/1471-2296-14-166

Mejia, B. (2017, May 9). How Houston has become the most diverse place in America. *Los Angeles Times*. Retrieved from http://www.latimes.com/nation/la-na-houston-diversity-2017-htmlstory.html

Miller Brown, S. (2002). Theory to practice: Strategies that contribute to nontraditional/adult student development and persistence. *PAACE Journal of Lifelong Learning, 11*, 67-76. Retrieved from ERIC Database (EJ642469)

Milojevich, H. M. & Lukowski, A. F. (2016). Sleep and mental health in undergraduate students with generally healthy sleep habits. *PLoS ONE, 11*(6), 1-14: e0156372. doi: 10.1371/journal.pone.0516372

Mohammadkhani, P., Dobson, K. S., Amiri, M., and Hosseini, G. F. (2010). Psychometric properties of the brief symptom inventory in a sample of recovered Iranian depressed patients. *International Journal of Clinical and Health Psychology, 10*(3), 541-551. Retrieved from Directory of Open Access Journal Database (Accession No. edsdoj.9dc2124b9c80456e9516b66c862aa4e5)

Mokdad, A. H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2004). Actual causes of death in the United States, 2000. *Journal of the American Medical Association, 291*(10), 1238-1245. doi: 10.1001/jama.291.10.1238.

Morgan, P., Simpson, J. & Smith, A. (2015). Health care workers' experiences of mindfulness training: A qualitative review. *Mindfulness, 6*(4), 744-758. doi: 10.1007/s12671-014-0313-3

Mrazek, M. D., Franklin, M. S., Phillips, D. T., Baird, B., & Schooler, J. W. (2013). Mindfulness training improves working memory capacity and GRE performance while reducing mind wandering. *Psychological Science, 24*(5), 776-781. doi: 10.1177/0956797612459659

Nauret, R. (2008). Stress affects learning and memory. *PsychCentral*. Retrieved from http://psychcentral.com/news/2008/03/12/stress-affects-learning-and memory/2031.html

Nelson, L. R. & Zaichkowsky, L. D. (1979). A case for using multiple regression instead of ANOVA in educational research. *Journal of Experimental Education, 47*(4), 324-330. doi: https://doi.org/10.1080/00220973.1979.11011701

Newcomer, J. W., Selke, G., Melson, A. K., Hershey, T., Craft, S., Richards, K., & Alderson, A. L. (1999). Decreased memory performance in healthy humans induced by stress-level cortisol treatment. *Archives of General Psychiatry, 56*(6). doi: 10.1001/archpsyc.56.6.527

Novotney, A. (2014). Students under pressure. *Monitor on Psychology, 45*(8), 36. Retrieved from http://www.apa.org/monitor/2014/09/cover-pressure.aspx

O'Donovan, A. & Hughes, B. M. (2008). Social support and loneliness in college students: Effects on pulse pressure reactivity to acute stress. *International Journal of Adolescent Medicine and Health*, *19*(4), 523-528. doi: 10.1177/1359105308095968

Oman, D., Shapiro, S. L., Thoresen, C. E., Plante, T. G., & Flinders, T. (2008). Meditation lowers stress and supports forgiveness among college students: A randomized controlled trial. *Journal of American College Health, 56*(5), 569-578. doi: 10.3200/JACH.56.5.569-578

Osborne, D. M., Pearson-Leary, J., & McNay, E. C. (2015). The neurogenetics of stress hormones in the hippocampus and implications for memory. *Frontiers in Neuroscience, 6*(9), 164. doi: 10.3389/fnins.2015.00164

Palmer, L. K., Economou, P., Cruz, D., Abraham-Cook, S., Huntington, J. S., Maris, M., … & Maley, L. (2014). The relationship between stress, fatigue, and cognitive functioning. *College Student Journal, 48*(1), 198-211. Education Source Database (Accession No. 96336726)

Palouse Mindfulness. (2017). Palouse mindfulness: Mindfulness-based stress reduction. Retrieved from https://palousemindfulness.com

Palouse Mindfulness. (2017). Sitting meditation script. Retrieved from https://palousemindfulness.com/docs/sittingmeditation_script.pdf

Paolucci, T., Baldari, C., Di Franco, M., Didona, D., Reis, V., … & Guidetti, L. (2016). A new rehabilitation tool in fibromyalgia: The effects of perceptive rehabilitation on pain and function in a clinical randomized controlled trial. *Evidence-Based Complementary and Alternative Medicine, 2016*(7574589). doi: 10.1155/2016/7574589

Parker, A. E., Kupersmidt, J. B., Mathis, E. T., Scull, T. M., & Sims, C. (2014). The impact of mindfulness education on elementary school students: Evaluation of the Master Mind program. *Advances in School Mental Health Promotion, 7*(3), 184-204. doi: 10.1080/1754730X.2014.916497

Patrick, Y., Lee, A., Raha, O., Pillai, K., Gupta, S., Sethi, S., … & Moss, J. (2017). Effects of sleep deprivation on cognitive and physical performance in university

students. *Sleep and Biological Rhythms, 15*(3), 217-225. doi: 10.1007/s41105-017-0099-5

Pereda, N., Forns, M., & Pero, M. (2007). Dimensional structure of the Brief Symptom Inventory with Spanish college students. *Psciothema, 19*(4), 634-639. Retrieved from Journals@OVID Database (Accession No. edsovi.01438443.200719040.00015)

Pierceall, E. A. & Keim, M. C. (2007). Stress and coping strategies among community college students. *Community College Journal of Research and Practice, 31*(9), 703-712. doi: 10.1080/10668920600866579

Ramler, T. R., Tennison, L. R., Lynch, J., & Murphy, P. (2016). Mindfulness and the college transition: The efficacy of an adapted mindfulness-based stress reduction intervention in fostering adjustment among first-year students. *Mindfulness*, *7*(1), 179-188. doi: 10.1007/s12671-015-0398-3

Ramsburg, J. T. & Youmans, R. J. (2014). Meditation in the higher-education classroom: Meditation training improves student knowledge retention during lectures. *Mindfulness, 5*(4), 431-441. doi: 10.1007/s12671-013-0199-5

Raniseski, J. (2014). *College success before, during and after*. Dubuque, IA: Kendall Hunt Publishing.

Rayle, A. D. & Chung, K. (2007). Revisiting first-year college students' mattering: Social support, academic stress, and the mattering experience. *Journal of College Student Retention: Research, Theory and Practice*, *9*(1), 21-37. doi: 10.2190/X126-5606-4G36-8132

Reme, S. E., Eriksen, H. R., & Ursin, H. (2008). Cognitive activation theory of stress—how are individual experiences mediated into biological systems? *Scandinavian Journal of Work, Environment, & Health Supplement, 6*, 177-183. Retrieved from EBSCO Database (Accession No. 000259091900021)

Rickenbach, E. H., Almeida, D. M., Seeman, T. E., & Lachman, M. E. (2014). Daily stress magnified the association between cognitive decline and everyday memory problems: An integration of longitudinal and diary methods. *Psychology and Aging, 29*(4), 852-862. doi: 10.1037/a0038072

Roberts, G., Quach, J., Gold, L., Anderson, P., Rickards, F., Mensah, F…. & Wake, M. (2011). Can improving working memory prevent academic difficulties? A school based randomised controlled trial. *BMC Pediatrics, 11*(57), 1-9. doi: 10.1186/1471- 2431-11-57.

Rogers, F. (2003). *The world according to Mister Rogers: Important things to remember*. New York, NY: Family Communications, Inc.

Rosenzweig, S., Reibel, D. K., Greeson, D. K., Brainard, G. C., & Hojat, M. (2003). Mindfulness-based stress reduction lowers psychological distress in medical students. *Teaching and Learning in Medicine, 15*(2), 88-92. doi: 10.1207/S15328015TLM1502_03

Ryan, C. & Bauman, K. (2016). Educational attainment in the United States: 2015. *U.S. Census Bureau*, 1-12. Retrieved from http://www.census.gov/content/dam/Census/library/publications/2016/demo/p20-578.pdf

Ryan, T. E. (2009). Minor hassles in community college student life. *Community College Journal of Research and Practice, 33*(6), 502-509. doi: 10.1080/10668920802487760

Sajid, A., Ahmad, T., Khalid, T. (2015). Stress in medical undergraduates; its association with academic performance. *Bangladesh Journal of Medical Science, 14*(2), 135-141. doi: 10.3329/bjms.v14i2.21815

Saleh, D., Camart, N., & Romo, L. (2017). Predictors of stress in college students. *Frontiers in Psychology, 8*(19). doi: 10.3389/fpsyg.2017.00019

Schneider, A., Hommel, G., & Blettner, M. (2010). Linear regression analysis: Part 14 of a series on evaluation of scientific publications. *Deutsches Arzteblatt, 107*(44), 776-782. doi: 10.3238/arztebl.2010.0776

Schneiderman, N., Ironson, G., & Siegel, S. D. (2005). Stress and health: Psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology, 1*, 607-628. doi: 10.1146/annurev.clinpsy1.102803.144141

Schonert-Reichl, K. A., Lawlor, M. S., Abbott, D., Thomson, K., Oberlander, T. F., & Diamond, A. (2015). Enhancing cognitive and social-emotional development through a simple to administer mindfulness-based school program for elementary school children: A randomized controlled trial. *Developmental Psychology, 51*(1), 52-66. doi: http://dx.doi.org/10.1037/a0038454

Schwabe, L. & Wolf, O. T. (2010). Learning under stress impairs memory formation. *Neurobiology of Learning and Memory, 93*(2), 183-188. doi: 10.1016/j.nlm.2009.09.009

Schwind, J. K., McCay, E., Beanlands, H., Martin, L. S., Martin, J., & Binder, M. (2017). Mindfulness practice as a teaching-learning strategy in higher education: A qualitative exploratory pilot study. *Nurse Education Today, 50*, 92-96. doi: 10.1016/j.nedt.2016.12.0170260-6917

Segerstrom, S. C. & Miller, G. E. (2004). Psychological stress and the human immune system: A meta-analytic study of 30 years of inquiry. *Psychological Bulletin, 130*(4), 601-630. doi: 10.1037/0033-2909.130.4.601

Senders, A., Bourdette, D., Hanes, D., Yadav, V., & Shinto, L. (2014). Perceived stress in multiple sclerosis: The potential role of mindfulness in health and wellbeing. *Journal of Evidence Based Complementary and Alternative Medicine, 19*(2), 104-111. doi: 10.1177/2156587214523291

Seyle, H. (1956). *The stress of life*. New York: McGraw-Hill.

Shankar, N. L. & Park, C. L. (2016). Effects of stress on students' physical and mental health and academic success. *International Journal of School & Educational Psychology, 4*(1), 5-9. doi: 10.1080/21683603.2016.1130532

Shapiro, S. L., Brown, K. W., & Astin, J. A. (2008). Toward the integration of meditation into higher education: A review of research. M. Duerr (Ed.). *Contemplative Mind in Society.* Retrieved from www.contemplativemind.org/files/MedandHigherEd.pdf

Shi, Z. & Liu, P. (2016). Worrying thoughts limit working memory capacity in math anxiety. *PLOS ONE, 11*(10: e0165644). doi: 10.1371/journal.pone.0165644

Sibinga, E. M. S., Kerrigan, D., Stewart, M., Johnson, K., Magyair, T., & Ellen, J. M. (2011). Mindfulness-based stress reduction for urban youth. *Journal of Alternative and Complementary Medicine, 17*(3), 213-218. doi: 10.1089/acm.2009.0605

Statistics Solution. (2017). Effect size [www document]. Retrieved from http://www.statisticssolutions.com/statistical-analyses-effect-size

Tacon, A. M. (2003). Meditation as a complementary therapy in cancer. *Family & Community Health: Journal of Health Promotion & Maintenance, 26*(1), 64-73. doi: 10.1097/00003727-200301000-00008

The Duke Endowment. (2017). Researching and strengthening student resiliency on college campuses. Retrieved from http://dukeendowment.org/our-work/researching-and-strengthening-student-resilience-on-college-campuses

Thompson, B. (1986). ANOVA versus regression analysis of ATI designs: An empirical Investigation. *Educational and Psychological Measurement, 46*(4), 917-928. doi: 10.1177/001316448604600411

Tugend, A. (2017, June 7). Colleges get proactive in addressing depression on campus. *The New York Times*. Retrieved from https://www.nytimes.com/2017/06/07/education/colleges-get-proactive-in-addressing-depression-on-campus.html

Uddin, A. (2015). *Effect of sleep on vigilance, short-term memory, and learning in college students* (Doctoral dissertation). Retrieved from ScholarWorks Database (Accession No. wldu.dissertations.2859)

U.S. Department of Education. (2017). Institute of Education Sciences, National Center for Educational Statistics. Retrieved from https://nces.ed.gov/fastfacts/display.asp?id=372

Vaez, M. & LaFlamme, L. (2008). Experienced stress, psychological symptoms, self-rated health and academic achievement: A longitudinal study of Swedish university students. *Social Behavior and Personality, 36*(2), 183-196. doi: 10.2224/sbp.2008.36.2.183

Vogel, S. & Schwabe, L. (2016). Learning and memory under stress: Implications for the classroom. *NPJ Science of Learning, 1*(e16011). doi: 10.1038/npjscilearn.2016.11

Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychological Review, 96*(2), 234-254. doi: 10.1037/0033-295X.96.2.234

Wechsler, D. (2009). *WMS-IV: Wechsler Memory Scale-Fourth Edition administration and scoring manual*. San Antonio, Texas: NCS Pearson, Inc.

Welle, P. D. & Graf, H. M. (2011). Effective lifestyle habits and coping strategies for stress tolerance among college students. *American Journal of Health Education, 42*(2). doi: 10.1080/19325037.2011.10599177

Yang, C., Liu, J., Chai, B., Fang, Q., Zhao, L., … & Wang, J., (2013). Stress within a restricted time window selectively affects the persistence of long-term memory. *Plos ONE, 8*(3), e59075. doi: 10.1371/journal.pone.0059075

Zeidenberg, M. (2008). Community colleges under stress. *Issues in Science and technology, 24*(4), 1-6. Retrieved from

https://ccrc.tc.columbia.edu/media/k2/attachments/community-colleges-under-stress.pdf

Appendix A: Sponsoring Institution IRB Approval Letter

IRB

Institutional Review Board
For Human Subjects

NOTICE OF IRB APPROVAL

TO:

FROM:

Date: August 29.2018

Protocol Title: Stress Levels of College Students and Memory Functioning with the Implementation of Brief Mindfulness Meditation

Expiration Date: 8/29/2019

The above-referenced was **APPROVED with restriction** following IRB Review for the period of 8/29/2018 through 8/28/2019.

Restriction
The restriction is that only flyers posted in the Student Center and around campus on information boards will be allowed. Emails to faculty are not approved.

This approval does not replace any departmental or other approvals that may be required.

Federal regulations require that all research be reviewed at least annually. It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without IRB approval.

- If you wish to have your protocol approved for continuation, please contact the Director of Institutional Effectiveness and Research at
- All changes or amendments to your protocol or consent form require review and approval by the IRB BEFORE implementation.
- If the research, including data analysis, has been completed, or if you wish to terminate the study, please notify the Director of Institutional Effectiveness and Research.

Appendix B: Walden IRB Approval

The IRB approval number for this study is 10-04-18-0418770.

Appendix C: Student Recruitment Flyer

First-Year Students!

Do you want to learn more about your stress levels? Do you want to test your memory? Do you want to see what all the fuss is about with stress-reduction techniques?

If this is you, and you're at least 18 years old, then I invite you to participate in a 1-hour research study in

Upon completion of the study, there will be a quick debriefing and snacks!

Contact me at for more information

Appendix D: Control Group Data Collection Facilitator Instructions

Welcome them. Thank them for their time.

"*Let's get started. There are a few forms I need you to fill out before we can start the actual study*." Remind them there will be no talking amongst themselves and no sharing of answers as this can skew results. Tell them to protect their papers from any eyes but their own.

FOLDER 1

Pass out the informed consent forms. Tell them, "*I am giving you two copies of the informed consent to participate in this study. One copy will be for you to sign, the other will be for you to keep. Please read through this. Initial at the bottom of every page, and sign your name on page 3 and put today's date, October 24, 2018. Pass these up to the front of your row and I will pick up the signed copies. The other copy is for you to keep.*" Collect signed informed consents, put in Folder 1.

FOLDER 2

Pass out the demographic sheet. Tell them, "*I'm passing out a demographic sheet. Do not put your name on this or any other papers going forward. The participant number you were assigned, will be in the top right-hand corner of this paper*." Read through the demographic questions with them. Say, "*Pass this paper up the row and I will collect them*." Put in Folder 2.

BSI PRETEST

Pass out the BSI. Say, "*I'm passing out a paper with some statements on it. I'm going to go through and read these to you. What I need you to do is to rate yourself on*

how you feel right now. Circle a 0 if the statement sounds nothing like you; a 1 if it sounds like you a little bit; a 2 if it sounds like you moderately, so some of the time, but not all the time; a 3 if it sounds like you quite a bit; and a 4 if it sounds like you all the time." Read the statements to them. "I will collect these from you." Put these papers in the folder labeled BSI pretest.

*****Relaxation time***** Prepare the audio/computer. On YouTube: https://www.youtube.com/watch?v=kB4qohP35iM

Tell them, "*I'm going to turn out the lights. I'm going to leave the blinds open so some light can come through. Just relax while you listen to this."* Turn off the lights and play the music (there might be an ad, so don't turn on the sound until after the ad has passed.

At the end of the music (15 minutes), turn the lights back on and tell them, "*Okay, we're moving on to something else*."

BSI POSTTEST

Pass out the BSI. Say, "*I'm passing out a paper with some statements on it. I'm going to read these statements to you. What I need you to do is to rate yourself on how you feel right now. Circle a 0 if the statement sounds nothing like you; a 1 if it sounds like you a little bit; a 2 if it sounds like you moderately, so some of the time, but not all the time; a 3 if it sounds like you quite a bit; and a 4 if it sounds like you all the time*." Read

the statements to them. "*I will collect them from you."* Put these papers in the folder labeled BSI posttest.

LOGICAL MEMORY I STORY B

Pass out blank sheet of paper with corresponding participant numbers. Once everyone has their pens down, say, "*I'm going to read something to you and I want you to try to remember as many details as you can. You cannot write anything down, not on the paper, not in your phone, just listen."*

Read Logical Memory I story (Story B)

Say, "*Now, on the paper in front of you, write down as many details of this story as you can remember, no matter how minor, write down as many specific details as you can possibly remember from what I just read*." Give them no more than about 3 minutes to do this. Pick up the papers. Put these papers in folder labeled Logical Memory I.

LOGICAL MEMORY I STORY C

Pass out blank sheet of paper with corresponding participant numbers. Say, "Keep your *pen down*." Once everyone has their pens down, say, "*I'm going to read something to you and I want you to try to remember as many details as you can. You cannot write anything down, not on the paper, not in your phone, just listen."*

Read Logical Memory I story (Story C)

Say, "*Now, on the paper in front of you, write down as many details of this story as you can remember, no matter how minor, write down as many specific details as you can possibly remember from what I just read*." Give them no more than about 3 minutes to do this. Pick up the papers. Put these papers in folder labeled Logical Memory I.

****Visual Reproduction.** You will use the computer to show images on the projector screen.****

Timer is set for 10 seconds for each image.

VISUAL REPRODUCTION I

Pass out blank sheet of paper with corresponding participant numbers.

You will **show each image for 10 seconds, giving them time to draw the item after you show it to them**.

Say, *"I will show you some images. You will have 10 seconds to look at each image. When the 10 seconds is over, the screen will be blank and you will draw the design on the paper in front of you. Each design will be on each paper. After you have drawn each design, I will pick it up from you. We will do this one by one. Do not begin to draw until I tell you to. Ready?"* Show the first image. 10 seconds. Change to blank image. Tell them, "*Now, draw the image you just saw."* Give them no more than 3 minutes to do this, pick them up as they finish drawing image 1.

Continue this for the remaining images-there are 5 images total. Put these papers in folder labeled Visual Reproduction I.

LOGICAL MEMORY II, DELAYED RECALL

Pass out blank sheet of paper with corresponding participant numbers. Tell them, "*Do you remember the stories I read to you a little while ago? I want you to write down everything you can remember about the first story. Start at the beginning*." Give them time to write their details (about 3 minutes). Pick up the papers. Put these in the folder labeled Logical Memory II, Delayed Recall.

LOGICAL MEMORY II

Pass out blank sheet of paper with corresponding participant numbers. Say, *"Now, I want you to write down everything you can remember about the last story. Start at the beginning*." Give them time to write their details (about 3 minutes). Pick up the papers. Put these in the folder labeled Logical Memory II, Delayed Recall.

VISUAL REPRODUCTION II

Pass out blank sheets of paper with corresponding participant numbers. They are in a packet of 5 pages per packet.

Say, *"Earlier, I showed you some designs. You looked at the designs and then drew them on the papers. I want you to draw the designs again. You don't have to draw them in the same order as you did before. If one design was on the screen, just draw one design. If two designs were on the screen, draw both designs as you remember them. Now, using the sheet of paper in front of you, draw the design."* If someone says they don't remember the designs, say, *"Each slide had one or more designs on it…Just try to remember one of them."* Give them time to draw the design on the first page (about 3 minutes).

Say, "*Now, go to the second page. Draw another one of the designs on the paper in front of you."* Give them time to draw the design (about 3 minutes).

Say, "*Now, go to the third page. Draw another one of the designs on the paper in front of you."* Give them time to draw the design (about 3 minutes).

Say, "*Now, go to the fourth page. Draw another one of the designs on the paper in front of you."* Give them time to draw the design (about 3 minutes).

Say, "*Now, go to the fifth page. Draw another one of the designs on the paper in front of you."* Give them time to draw the design (about 3 minutes).

Pick up the papers. Put these papers in the file folder labeled Visual Reproduction II, Delayed Recall.

RESOURCES

Pass out the Resource page. Explain, **"***This handout gives you resources for the counseling clinic here on campus and the mental health clinic in Alvin. The other group used diaphragmatic breathing and sitting meditation while they listened to the music. These are forms of mindfulness-based stress reduction. The resource page gives you some quick tips on how to do this. To learn how to perform diaphragmatic breathing, you sit with good posture, place one hand on your stomach, one hand on your upper chest. Breathe in through your nose, slowly. Your stomach moves out as you breathe in and your upper chest should be still. Exhale slowly through your mouth while tightening your stomach muscles. With sitting meditation, you also stay in good posture, use diaphragmatic breathing. Pay attention to each breath, coming in and going out. Concentrate your thoughts in the here and now and let every breath, in and out, remind you of being in the here and now, clearing your mind of all other thoughts with each inhaling and exhaling breath."*

Encourage them to grab a water and snack on their way out and thank them for their time.

Appendix E: Treatment Group Data Collection Facilitator Instructions

Welcome them. Thank them for their time.

"*Let's get started. There are a few forms I need you to fill out before we can start the actual study*." Remind them there will be no talking amongst themselves and no sharing of answers as this can skew results. Tell them to protect their papers from any eyes but their own.

FOLDER 1

Pass out the informed consent forms. Tell them, "*I am giving you two copies of the informed consent to participate in this study. One copy will be for you to sign, the other will be for you to keep*. *Please read through this. Initial at the bottom of every page, and sign your name on page 3 and put today's date, October 24, 2018. Pass these up to the front of your row and I will pick up the signed copies. The other copy is for you to keep.*" Collect signed informed consents, put in Folder 1

FOLDER 2

Pass out the demographic sheet. Tell them, "*I'm passing out a demographic sheet. Do not put your name on this or any other papers going forward. The participant number you were assigned, will be in the top right-hand corner of this paper*." Read through the demographic questions with them. Say, "*Pass this paper up the row and I will collect them*." Put in Folder 2

BSI PRETEST

Pass out the BSI. Say, "*I'm passing out a paper with some statements on it. I'm going to go through and read these to you. What I need you to do is to rate yourself on how you feel right now. Circle a 0 if the statement sounds nothing like you; a 1 if it sounds like you a little bit; a 2 if it sounds like you moderately, so some of the time, but not all the time; a 3 if it sounds like you quite a bit; and a 4 if it sounds like you all the time*." Read the statements to them. "I will collect these from you." Put these papers in Folder 3 BSI pretest

*****Relaxation time***** Prepare the audio/computer. On YouTube: https://www.youtube.com/watch?v=kB4qohP35iM

Tell them, "*I'm going to show you how to do something called diaphragmatic breathing To learn how to perform diaphragmatic breathing, you sit with good posture, place one hand on your stomach, one hand on your upper chest. Breathe in through your nose, slowly. Your stomach moves out as you breathe in and your upper chest should be still. Exhale slowly through your mouth while tightening your stomach muscles. With sitting meditation, you also stay in good posture, use diaphragmatic breathing. Pay attention to each breath, coming in and going out. Concentrate your thoughts in the here and now and let every breath, in and out, remind you of being in the here and now, clearing your mind of all other thoughts with each inhaling and exhaling breath."*

Give them about 2 minutes to practice diaphragmatic breathing. Repeating the instructions as needed.

"*I'm going to turn out the lights. I'm going to leave the blinds open so some light can come through. Just relax, concentrate in the here and now. Keep breathing. Feel your*

air going in and out. Feel free to close your eyes. Listen." Turn off the lights and play the music (there might be an ad, so don't turn on the sound until after the ad has passed. Read the Palouse Script.

At the end of the music (15 minutes), turn the lights back on and tell them, "*Okay, we're moving on to something else*."

BSI POSTTEST

Pass out the BSI. Say, "*I'm passing out a paper with some statements on it. I'm going to read these statements to you. What I need you to do is to rate yourself on how you feel right now. Circle a 0 if the statement sounds nothing like you; a 1 if it sounds like you a little bit; a 2 if it sounds like you moderately, so some of the time, but not all the time; a 3 if it sounds like you quite a bit; and a 4 if it sounds like you all the time*." Read the statements to them. "*I will collect them from you."* Put these papers in the folder labeled BSI posttest.

LOGICAL MEMORY I STORY B

Pass out blank sheet of paper with corresponding participant numbers. Once everyone has their pens down, say, "*I'm going to read something to you and I want you to try to remember as many details as you can. You cannot write anything down, not on the paper, not in your phone, just listen."*

Read Logical Memory I story (Story B)

Say, "*Now, on the paper in front of you, write down as many details of this story as you can remember, no matter how minor, write down as many specific details as you*

can possibly remember from what I just read." Give them no more than about 3 minutes to do this. Pick up the papers. Put these papers in the folder labeled Logical Memory I.

LOGICAL MEMORY I STORY C

Pass out blank sheet of paper with corresponding participant numbers. Say, "Keep your *pen down*." Once everyone has their pens down, say, "*I'm going to read something to you and I want you to try to remember as many details as you can. You cannot write anything down, not on the paper, not in your phone, just listen."*

Read Logical Memory I story (Story C)

Say, "*Now, on the paper in front of you, write down as many details of this story as you can remember, no matter how minor, write down as many specific details as you can possibly remember from what I just read*." Give them no more than about 3 minutes to do this. Pick up the papers. Put these papers in the folder labeled Logical Memory I.

****Visual Reproduction.** You will use the computer to show images on the projector screen.**

Timer is set for 10 seconds for each image.

VISUAL REPRODUCTION I

Pass out blank sheet of paper with corresponding participant numbers.

You will **show each image for 10 seconds, giving them time to draw the item after you show it to them**.

Say, *"I will show you some images. You will have 10 seconds to look at each image. When the 10 seconds is over, the screen will be blank and you will draw the design on the paper in front of you. Each design will be on each paper. After you have drawn*

each design, I will pick it up from you. We will do this one by one. Do not begin to draw until I tell you to. Ready?" Show the first image. 10 seconds. Change to blank image. Tell them, "*Now, draw the image you just saw."* Give them no more than 3 minutes to do this, pick them up as they finish drawing image 1.

Continue this for the remaining images-there are 5 images total. Put these papers in the folder labeled Visual Reproduction I

LOGICAL MEMORY II

Pass out blank sheet of paper with corresponding participant numbers. Tell them, "*Do you remember the stories I read to you a little while ago? I want you to write down everything you can remember about the first story. Start at the beginning*." Give them time to write their details (about 3 minutes). Pick up the papers. Put these papers in the folder labeled Logical Memory II

LOGICAL MEMORY II

Pass out blank sheet of paper with corresponding participant numbers. Say, *"Now, I want you to write down everything you can remember about the last story. Start at the beginning*." Give them time to write their details (about 3 minutes). Pick up the papers. Put these papers in the folder labeled Logical Memory II

VISUAL REPRODUCTION II

Pass out blank sheets of paper with corresponding participant numbers. They are in a packet of 5 pages per packet.

Say, *"Earlier, I showed you some designs. You looked at the designs and then drew them on the papers. I want you to draw the designs again. You don't have to draw*

them in the same order as you did before. If one design was on the screen, just draw one design. If two designs were on the screen, draw both designs as you remember them. Now, using the sheet of paper in front of you, draw the design." If someone says they don't remember the designs, say, *"Each slide had one or more designs on it…Just try to remember one of them."* Give them time to draw the design on the first page (about 3 minutes).

Say, "*Now, go to the second page. Draw another one of the designs on the paper in front of you."* Give them time to draw the design (about 3 minutes).

Say, "*Now, go to the third page. Draw another one of the designs on the paper in front of you."* Give them time to draw the design (about 3 minutes).

Say, "*Now, go to the fourth page. Draw another one of the designs on the paper in front of you."* Give them time to draw the design (about 3 minutes).

Say, "*Now, go to the fifth page. Draw another one of the designs on the paper in front of you."* Give them time to draw the design (about 3 minutes).

Pick up the papers. Put these papers in the folder labeled Visual Reproduction II.

RESOURCES

Pass out the Resource page. Explain, **"***The resource page gives you some quick tips on diaphragmatic breathing and sitting meditation. It also gives your resources for the counseling clinic here on campus and the mental health clinic in Alvin."*

Encourage them to grab a water and snack on their way out and thank them for their time.

Appendix F: Demographic Sheet

Demographic Sheet

1) Check here if you are at least 18 years old: _____
2) How old are you? _____ years old
3) Check here if you are a first-year college student: _____
4) Check to indicate gender: _____ Male _____ Female
5) Check here if you have a significant, unaided visual impairment:_____
6) Check here if you have a significant, unaided fine motor impairment (i.e., extreme difficulties holding a pencil): _____
7) Check here if you have a significant, unaided hearing impairment: _____

Appendix G: Permissions/Licensing Agreement for Use of BSI and WMS-IV

Rebecca Lopez Inventory Account Number 10XXXX

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DMCA Designated Agent
Pearson Education, Inc.
221 River Street
Hoboken, NJ 07030
email: pearsondmca.agent@pearson.com

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- A physical or electronic signature of the owner, or a person authorized to act on behalf of the owner, ("Complaining Party") of an exclusive right that is allegedly being infringed upon; Information reasonably sufficient to permit Pearson to contact the Complaining Party, such as an address, telephone number, and if available, an electronic mail address;
- Identification of the allegedly infringing material on the Services ("Infringing Material"), and information reasonably sufficient to permit Pearson to locate such material on the Services; Identification of the copyrighted work claimed to have been infringed upon ("Infringed Material"), or if multiple copyrighted works on the Services are covered by a single Notice, a list of each copyrighted work claimed to have been infringed (please be specific as to which Infringing Material is infringing on which Infringed Material);
- A statement that the Complaining Party has a good faith belief that use of Infringing Material in the manner complained of is not authorized by the copyright owner, its agent, or the law; and

A statement that the information in the Notice is accurate, and under penalty of perjury, that the Complaining Party is the owner or is authorized to act on behalf of the owner of an exclusive right that is allegedly infringed.

25. Reporting other Prohibited Content

Pearson also encourages you to report to dmca.agent@pearsoned.com any content on or accessible through the Services which you believe contains infringing content, malicious code, or any offensive, libelous, or otherwise illegal or that is otherwise prohibited under this EULA. To ensure Pearson can quickly respond to the issue, your email should include: the originating Pearson page URL; the linked page URL; a description of the content in question and the basis upon which you believe the content is prohibited or otherwise inappropriate; and the contact information through which Pearson may best reach you if you are willing to further assist Pearson in its investigation.

26. Miscellaneous

This EULA is personal to you, and you may not assign, transfer or delegate your rights or obligations under this EULA to anyone. Pearson may assign or delegate its rights or obligations under this EULA, in whole or in part, subject to Pearson's right and obligations under this EULA and any agreement it may have with your Institution. In the event that any provision of this EULA is held by a court of competent jurisdiction to be invalid or unenforceable for any reason, the remainder of this EULA shall remain valid and enforceable according to its terms. This EULA is the entire agreement between Pearson and you with respect to the Services and cannot be modified absent a signed written agreement. Headings in this EULA are for your convenience only and do not have any legal meaning or effect. If Pearson waives or fails to enforce any term or condition of this EULA on any one or more occasions, whether by conduct or otherwise, its waiver or failure to enforce such terms will not prevent Pearson from enforcing any terms or condition of this EULA at any other time. The meaning of this EULA cannot be changed by your or Pearson's conduct, even if repeated, or by any custom or practice of others engaged in the same or similar businesses. In addition to being a part of the registration form, this EULA is accessible through a link on the Services so that you may reference it at any time. It is the express wish of the parties that this EULA and all related documents be drawn up in English. C’est la volonté expresse des parties que la présente convention ainsi que les documents qui s’y rattachent soint rédigés en anglais.

27. Provisions Not Applicable in New Jersey

Pursuant to the New Jersey Truth in Consumer Contract Warranty and Notice Act, the following provisions in this Terms of Use do not apply to those persons covered by that law such as residents of the State of New Jersey or individuals accessing the Services from within the State of New Jersey: Sections 16 and 19-22.

Version: 1.2

Last Revised: May 18, 2018

PEARSON

Order History

Order Details

Wechsler Memory Scale - Fourth Edition
(1 product)

WMS-IV

Shipping Details: **Billing Details:**

Print

PEARSON

Order History

Order Number

Qualified User Profile:

Order Details

Brief Symptom Inventory
(1 product)

Shipping Details:

Billing Details:

Print

Appendix H: Palouse Mindfulness Sitting Meditation Script

Sitting Meditation Script
[Free audio recording of this meditation and others are available on the Palouse Mindfulness website]
This segment guides you through a sitting meditation with breath as the primary object of awareness... Arranging to spend this time in a comfortable but attentive posture, preferably sitting up without letting back for support, if that's possible for you. Sitting in a dignified posture, head balanced on shoulders, arms and hands resting in a comfortable position.
This is a time to switch from our normal mode of doing and moving and reacting to one of ***simply being***. Just be attentive to what's happening within your own awareness, right here and right now.
And as you sit, ***just noticing sensations of breath***.
Just noticing how your abdomen moves on each in-breath and out-breath, the movement of air through your nostrils, a slight movement of chest and shoulders.
Just bring your awareness to your breath cycle and wherever it is the most vivid, whether it be your tummy, your chest or your shoulders, or the movement of air through your nostrils...
Noticing the entirety of breath, from the movement of the air coming in, and filling the lungs, and extending the abdomen slightly, the movement of air going out, and being aware of the pause, the stopping point, in between the in-breath and the out-breath, and the out-breath and the next in-breath. It's all one movement, even through the changing of direction; just notice where that pause is... seeing to what degree you can be aware of your whole entire cycle... recognizing that each part of the cycle is different from the other part... and this time through maybe different than the last time through, and each one is absolutely unique in its own way, if you pay attention.
You'll notice your attention from time to time shifting away from breath. The mind may wander into fantasies, or memories, thoughts of the day, worries that you might have, things you need to do... and ***without giving yourself a hard time*** when you notice that that happened, ***gently*** but firmly bring your attention back to the sensations of breathing... the actual physical sensations of breath as it moves through your body.
Being aware of where the mind goes... gently shifting your awareness to sensations of breath...
And notice the tendency to want TO CONTROL your breathing... Let the quality of attention be ***light and easy***... one of ***simply observing and noticing***... just as if you were on a float on a ***gently undulating*** sea... where you're up with one wave and down with the next... you don't control the duration of the wave, or the depth between the waves; you're just riding...
And just ***gently coming back*** to sensations of breathing...

You may notice that there are SOUNDS in addition to the sounds that come from this recording... sounds of traffic or movement, or something else going on... and ***just notice***

that your attention has moved to that perception of sound... just staying with it long enough to notice the quality of the sound... sound is vibration, tone, volume or intensity... being aware of the mind to label sound, as traffic, or as voices, or as music... and coming closer to the sound as it hits your ear drums... quality or pitch or rhythm or intensity... ***separating out the actual reception of sound from the labels*** we put on it...

And if you've been paying attention to sound or noticing that you've gotten off to noticing the perception of sound, bring your attention once again back to breath... letting your breath be your anchor of awareness... so that each time your awareness goes somewhere else, just gently coming back to breath, without judgment or any upset if you can do that. If you see that my attention has gone somewhere else, just coming back to breath...

And noticing the tendency TO HAVE AN OPINION about things... about liking the way things are going right now... not liking it, finding it uncomfortable; that too can be an object of awareness... just noticing that you have an opinion about things often. So, that's my liking mind; it's liking this. So that's my critical mind that would rather have things be different than they are... and that too can be noticed... building the capacity to notice liking or disliking... and ***not to have to do anything about it... how freeing that is!***

And as you notice that happening, just bring your awareness to the physical sensations of breath... wherever it's most vivid for you... ***just riding the entire cycle, one cycle after another.***

You may notice your attention shifting to BODY SENSATIONS, of achiness or discomfort... of tension... and as you notice these sensations of discomfort that happen for you, there's several things which can be done with just the sensation, and one is to, if it's one that can be remedied by shifting a little bit, one way to deal with the sensation is to allow yourself to shift, but in doing that, first becoming aware of the sensation, noticing precisely where the tension or the achiness might be, and once you're aware of where that is, developing an intention to move, and moving mindfully, and with full intent to make that motion. That's one way to deal with strong sensation. A second way, and neither one is better than the other is, as long as full awareness is brought to all parts, is to notice that sensation... noticing it in its fullness... being curious about the extent of it... how your experience of it is at the moment... the actual physical sensations of tension or of throbbing, or of tightness, or of pulling, or tingling. And the second way of dealing with it is just to notice that it's possible to stay for a moment longer with that sensation, ***experienced as pure sensation, without the labels*** of discomfort, or of tension, or of achiness; just noticing just where it is... noticing your experience of it... and ***staying with it, without having to react to it***, just for the moment...

And if your attention keeps getting called back to that area of intense sensation, knowing you have those 2 choices; of forming an intention to do something about it, and mindfully doing it, but forming intention first; or bringing your attention and intention right in to it. Be curious about it: How big is it? How long is it? What quality does it have? How is it changing over time?

And wherever the mind goes, in terms of thoughts, to liking or disliking, perceptions or sensation, or hearing of sound, or feelings of peace or of sadness, or frustration, or of

anticipation; just noticing these raw thought forms, and bringing awareness to sensations to the movement of breath...
And being curious about breath... observing that no 2 breaths are exactly the same...
And seeing if it is possible to have a FRIENDLY ATTITUDE toward whatever comes into your awareness... now if your mind has gone off on a fantasy or a thought, or a judgment, or a worry, or a sensation, or a sound, just in a ***friendly way*** notice that this is happening and coming back to breath. Recognizing that the ***entire cycle of awareness is important*** to this experience, including the movement from breath, and including the coming back...
And ***nothing to do but ride the waves*** of breath...
Seeing if it is possible in those moments when your awareness is gone somewhere else... noticing how that flicker of attention happens, that moment when you realize it is somewhere else, somewhere other than breath, and at that moment seeing if it is possible of having an ***attitude of CELEBRATION, of congratulation***, of recognition that ***this is a moment of awareness***. You acknowledge yourself for noticing you've gone somewhere else. And just easily bring your attention back to breath... in a ***friendly*** and a ***non-judgmental*** way.
As this meditation comes to an end, recognizing that you spent this time intentionally aware of your moment to moment experience... nourishing and strengthening your ***ability to be with whatever comes your way***... building the capacity for opening the senses... to the vividness, to the aliveness of the present moment... expanding your skill to be ***curious, and available, about whatever presents itself... without judgment.***

Appendix I: Debriefing Resources

Resources

MBSR Techniques

Diaphragmatic Breathing	Sitting Meditation
☐ Sit in chair, knees bent, with good posture	☐ Sit with good posture in quiet setting
☐ Place hand on stomach	☐ Utilize diaphragmatic breathing techniques
☐ Place other hand on upper chest	☐ Be attentive to each breath, in the moment
☐ Breathe in slowly through your nose (you should feel your stomach move out as you breathe in and your upper chest should remain still)	☐ Feel the air coming in and out
☐ Tighten your stomach muscles and slowly exhale through your mouth	☐ Concentrate in the here and now, in this moment on every breath and clear your mind to nothing more than what is happening, right now

Appendix J: Figures

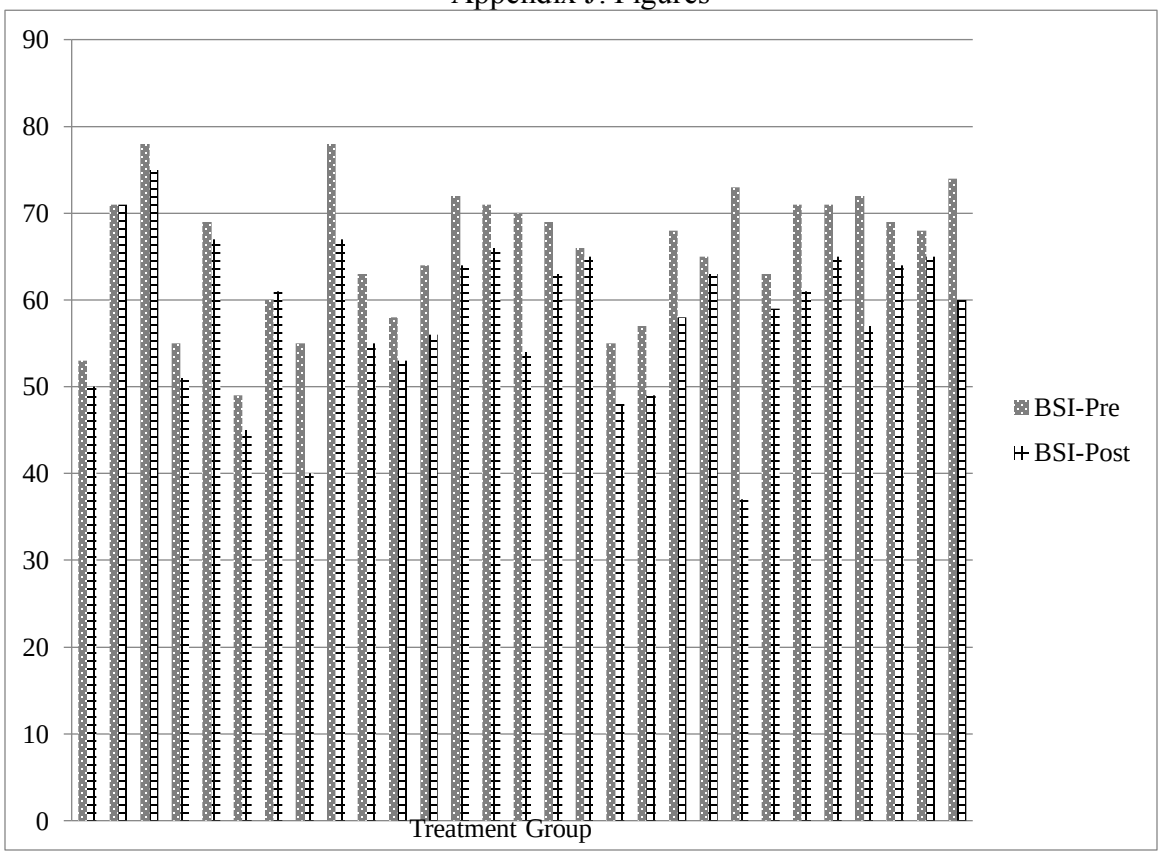

Figure J1. BSI Pre and Post-scores for treatment group (n = 29) represented by raw score for the Global Severity Index (GSI) and normed for non-patient population.

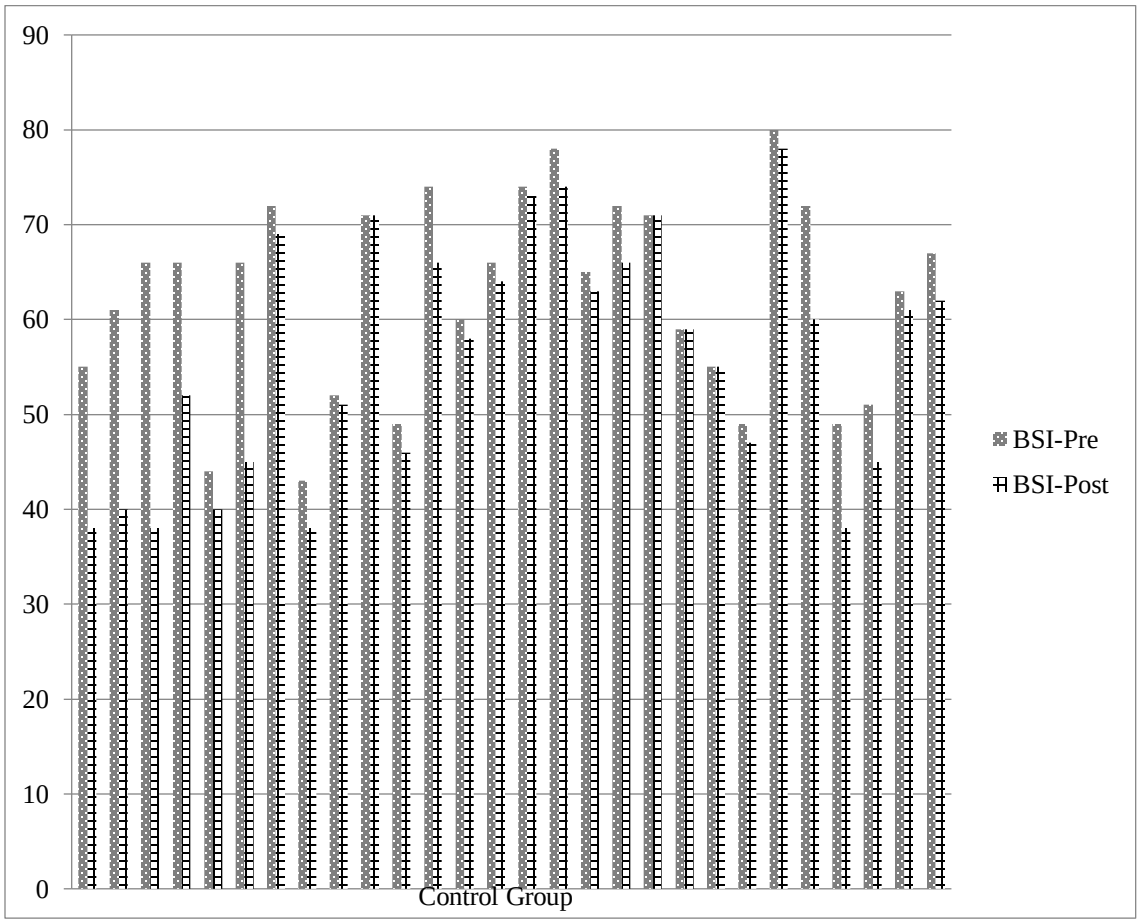

Figure J2. BSI Pre and Post-scores for control group (n = 28) represented by raw score for the Global Severity Index (GSI) and normed for non-patient population.

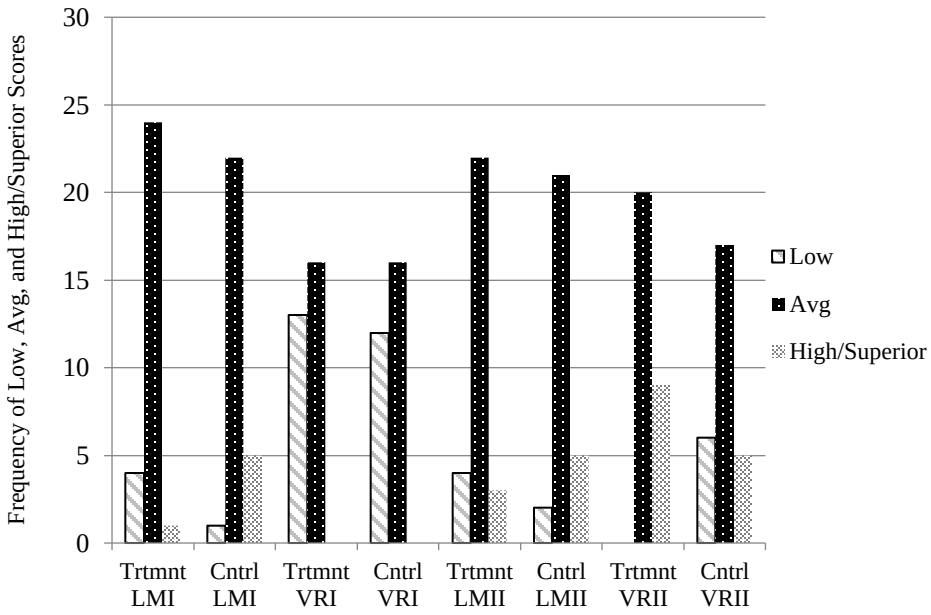

Figure J3. WMS-IV: Scaled Score Reporting with Frequencies of Treatment and Control Group Scores for LMI, VRI, LMII, VRII