The Effects of a Six-Week Mindfulness Intervention Designed for Adolescents on Emotion Regulation and Perceived Stress in College Students

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The Effects of a Six-Week Mindfulness Intervention Designed for Adolescents on Emotion Regulation and Perceived Stress in College Students

A Dissertation Presented to the Faculty of the Department of Psychology

West Chester University

West Chester, Pennsylvania

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Psychology in Clinical Psychology

By

Theodora Malinowski, M.S.

June, 2021
Dedication

This dissertation is dedicated to my father, George Stanko, who has given me unwavering encouragement and support. Thank you for teaching me the value of perseverance and for nurturing my love of learning. This work is also dedicated to my loving husband, Dane. Thank you for your guidance, support, and patience throughout this process.
Acknowledgements

I would like to thank my dissertation committee of Dr. Geeta Shivde, Dr. Sandra Kerr, Dr. Jodi McKibben, and Dr. Angela Clarke, for their oversight, advice, and contributions to this dissertation. Additionally, thank you to Deb Soderland for facilitating the group and providing guidance.

I would also like to thank my friends and family for their support and encouragement throughout this process and their help with my many revisions. George, Dane, Maddy, Giemaly, Lindsay, Julia, Sharon, Britni, Adessa, and Kelly- I would not have been able to do this without your help and I am endlessly grateful.
Abstract

College students are a vulnerable population to developing mental health problems. Without adequate emotion regulation abilities and adaptive coping skills to manage stress, college students are at risk of experiencing negative mental and physical health outcomes. Mindfulness has been shown to improve mental and physical health. Unfortunately, many mindfulness interventions are developed with the needs of adults in mind. Some features of common mindfulness programs, such as cost and required length of daily practice, make the interventions difficult for most college students to access. The present study investigated the effects of a six-week mindfulness intervention (Learning to BREATHE) that was initially designed for adolescents and later adapted for emerging adults on emotion regulation and perceived stress in college students. Self-report measures of difficulties in emotion regulation and perceived stress were analyzed to assess improvements from before to after the intervention in a group of introductory psychology students who participated in weekly in-person mindfulness training. These results were compared to a control group who received information about mindfulness, but no direct mindfulness training. Interactions between group and time, as well as main effects of group and time were explored. Results demonstrated significant decreases in scores on the Difficulties in Emotion Regulation (DERS) total and DERS Strategy subscales. Our results suggest that the Learning to Breath intervention can be helpful in reducing overall emotion regulation difficulties and increasing coping strategies in college students. Clinical implications and future directions are discussed.
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Chapter 1: Introduction

The transition to college represents a period of vulnerability. Changes in environment, increased responsibilities, more difficult coursework, and many other factors can lead to a sharp increase in stress for many students. Additionally, college students are at heightened risk of experiencing mental health problems such as anxiety and depression (Bai et al., 2020; Halladay et al., 2019). Without adequate support and coping skills, students are more likely to engage in maladaptive forms of coping such as substance use, self-harm, disordered eating, and are more likely to experience suicidal ideation (Cleary et al., 2011; Hunt & Eisenberg, 2010; Regehr et al., 2013; Ruberman, 2014).

The National Center for Education Statistics (NCES) reported 16.7 million undergraduate students enrolled for the Fall 2019 semester in the United States (Hussar et al., 2020). For many students, their time in college coincides with a developmental period known as emerging adulthood. This developmental period occurs between the ages of 18 and 25 and proposes that although many cultures have historically considered 18 to be the age that a person transitions into adulthood, many individuals in this age range are not fully functioning as adults (Arnett, 2000). The need for an additional developmental period that better encompasses the experience of many 18-25 year old’s is a response to cultural and economic shifts such as an increase in the average age of marriage, an increase in the number of students who choose to attend college, and increase in the average age people have children (Arnett, 2006; Arnett, 2007).

Although not all emerging adults are college students, those who are often face particularly difficult challenges while they navigate this transition. Given the likelihood that college students will experience heightened stress and the need for adaptive coping skills
throughout their enrollment, it is imperative that adequate resources and support be available to students to facilitate a successful college experience and sense of wellbeing.

Mindfulness has been shown to have numerous benefits on physical and mental wellbeing (Cullen, 2011; Kabat-Zinn, 1990; Lynch et al., 2018; Shonin et al., 2013; Vidic & Cherup, 2019). Unfortunately, the majority of research on the benefits of mindfulness has been conducted with adults. Although there has been an uptick in recent years, less attention has been given to developing and testing mindfulness interventions in younger populations. While there has been increased interest in the use of mindfulness interventions with college students, there is a need for more research on interventions that have been developed with this target demographic in mind.

The most common mindfulness interventions were developed for adults and are costly and time consuming, making them inaccessible to many college students. Learning to BREATHE (L2B) is a group mindfulness intervention that was designed with the needs of adolescents in mind. L2B is a once a week, cost effective group that requires less time commitment from students. In this study Learning to BREATHE was adapted for use with college students.

In order for students to reap the benefits of a mindfulness program, it is important for them to be engaged, attend the groups, and fulfill the other meaningful requirements of the group (such as homework, home practice, journaling, etc.). If classes are too expensive or held at times that aren’t convenient for students, it may serve as barriers to access these interventions. Similarly, if the concepts, examples, and discussions related to the group are confusing or unrelatable to students, there is a barrier to engagement and meaningful connection to the content of these interventions.
If mindfulness interventions are going to be offered to college students, they should be low to no cost, convenient, and developmentally appropriate for the students they intend to serve. This paper will begin with a literature review on emerging adulthood, stress and emotion regulation in college students, and mindfulness. The present study will then be described and the results will be discussed to understand the Learning to BREATHE impact on emotion regulation and perceived stress in the sample of college students. Implications and limitations will then be reviewed.
Chapter 2: Literature Review

Transition to College

College students are a vulnerable population and the transition to college is a time of increased risk for both developing mental health problems and increasing symptoms of preexisting mental illnesses (Cleary et al., 2011; Lynch et al., 2011; Ruberman, 2014). This transition often includes separation from the individual’s support system (friends and family) and a major adjustment to the new academic and social demands of college (Bamber & Schneider, 2016; Compas et al., 1986; Lynch et al., 2011; Marcotte et al., 2014; Peer et al., 2015). While this transition is exciting for many students, the reality of a new living environment, social demands, and increased workloads and academic pressures can be stressful for many (Ross et al., 1999). Individuals between the ages of 18 and 24 have the highest rates of mental illness across the lifespan, with roughly 37% of emerging adults reporting psychiatric problems (Ruberman, 2014). In particular, college students are at increased risk for depression and anxiety, and researchers have estimated that roughly 50% of college students endorse experiencing considerable levels of anxiety and depression (Greeson et al., 2014; Regehr et al., 2013). “In a large-scale national assessment, more than one-third of undergraduates reported ‘feeling so depressed it was difficult to function’ at least once in the previous year” (American College Health Association, 2008).

College counseling centers, often the only place students who live on campus are able to seek mental health services, have been reporting increased incidence of mental health concerns and utilization of counseling centers for more than a decade (Ghallagher et al., 2000; Hunt & Eisenberg, 2010). In recent years there has been a significant increase in prevalence rates of
mental illness among college students (Lynch et al., 2018; Marcotte et al., 2014). First-year college students are particularly prone to stress and mental health difficulties, and roughly 50% of college students with mental health issues report a connection between the timing of their initial symptoms and their transition to college (Marcotte et al., 2014). College students are also more likely to experience elevated stress levels (Karyotaki et al., 2020; Mahfouz et al., 2018; Oman et al., 2008, Ross et al., 1999). It is important to note that the events associated with the college transition are not what causes this stress, but rather an individual’s inability to adaptively cope with these changes (Ross et al., 1999). For example, two people can experience similar adversity, but if one person has strong internal coping skills and a strong support system while the other does not, it can lead to increased stress levels for the person whose ability to cope is not as developed. If these two people both decide to attend college, the transition to college itself would not be the catalyst for increased stress, but rather their own reduced coping ability. If students do not have adequate emotion regulation abilities and coping skills to handle the transition to college, it can lead to more serious long-term problems, such as impaired academic performance, use of maladaptive coping skills, and overall poor mental health (Dyson & Renk, 2006; Vidic & Cherup, 2019).

**Emerging Adulthood**

Emerging adulthood, not to be confused with “late adolescence”, is a distinct developmental phase that presents a variety of challenges and transitions (Arnett, 2000; Baghurst & Kelley, 2014; Karyotaki, 2020; Peer et al., 2015; Rogers, 2013). This unique stage of development, which occurs after adolescence and before adulthood, typically consists of individuals between the ages of 18 and 25 (Arnett, 2000; Arnett, 2001; Dyson & Renk, 2006; Greeson et al., 2014).
This range also represents the age of most traditional college students (Greeenon et al., 2014; Rogers, 2013).

The concept of Emerging Adulthood was introduced by Arnett as a way to conceptualize a shift that he felt was developing due to cultural changes. Arnett argued that in our current society, the idea that adolescents shift into adults as soon as they turn 18 was no longer true. Due to cultural shifts, Arnett recognized the need for a developmental stage between adolescence and adulthood (2000). Examples of cultural shifts include the average age of marriage, at what age many people decide to start a family, and increased enrollment in college (Arnett, 2000; Arnett, 2014). For instance, there was a six-year increase in the age at which the average American gets married between 1970 and 2010 (Arnett, 2014). A similar trend has been observed in the age that many Americans have their first child (Arnett, 2014). Arnett argues that this shift towards getting married and having children later into the 20’s, has allowed young people more opportunity for independence and identity exploration.

It is important to note that Arnett has done a large portion of his research on emerging adults within the United States, but his findings are relevant in many other industrialized nations (Arnett, 2000; Arnett, 2014; Douglass, 2007). This may be the norm in some countries; however, this stage of development may not fit for everyone in this age bracket. Individuals living in less developed nations or in contexts where a person might need to take on a lot of responsibility during their teen years may not have many of the experiences that give rise to the key elements of emerging adulthood. Arnett does address this by noting that although there are five key features of emerging adulthood, this is the most heterogeneous stage of development.

Arnett (2014) posited that there are five key features of emerging adulthood: identity exploration, instability (in regards to living situations, social circle, career aspirations, etc.), self-
focus, feeling in-between adolescence and adulthood, and feeling as though life is full of possibilities. Ultimately, most college students are at a unique stage of development as they exit adolescence and begin their transition into young adulthood (Arnett, 2000; Karyotaki, 2020). This developmental period is marked by a focus on self-exploration and instability in many contextual factors. Although individuals over the age of 18 have traditionally been viewed as adults, the majority of 18 to 25-year old individuals report that they do not yet think of themselves as adults (Arnett, 2001; Rogers, 2013). While this developmental period is frequently characterized by personal growth and identity development, it also commonly includes role transitions, heightened stress, and increased responsibilities (Arnett, 2004; Roberts, 2013).

**Stress in College Students**

Stress, defined by the American Psychiatric Glossary (Shahrokh & Hales, 2003) as the “pattern of responses that an individual makes to stimulus events that disturb his/her equilibrium and exceed his/her ability to cope” is a pervasive experience for most college students (Bamber & Schneider, 2016; Canby et al., 2015; Mahfouz et al., 2018). Without the proper skills to adaptively cope, stress can impact students’ success in college (Dusselier et al., 2005; Dyson & Renk, 2006; Oman et al., 2008; Peer et al., 2015; Struthers et al., 2000; Thomas & Borraro, 2016). When the level of stress overwhelms a student’s ability to cope, it can lead to academic impairment and lower overall GPA, reduced productivity, difficulties with professors and peers, increased risk of addiction, and adverse physical and mental health outcomes (Bamber & Schneider, 2016; Bettis et al., 2017; Bovier et al., 2004; Dusselier et al., 2005; Peer et al., 2015; Thomas & Borraro, 2016).
Negative implications of stress include fatigue, headaches, loneliness, decreased appetite, difficulty with attention and memory, feeling overwhelmed, insomnia, anxiety, depression, and thoughts of suicide (Musabiq & Karimah, 2020; Oman et al., 2008; Ross et al., 1999). In addition to these concerning implications of stress on mental and physical health, stress is one of the top barriers to academic success for college students, ranking above several other common health and personal concerns, including problems sleeping, interpersonal difficulties, and concerns about family and friends (Bamber & Schneider, 2016; Dusselier et al., 2005, Oman et al., 2008). Unfortunately, roughly 50% of college students report experiencing stress levels so high that it has led to functional impairment, and more than 50% of college students rank their stress levels as “above average or extreme” (Kang et al., 2009; Mahfouz et al., 2018). Given the clear negative implications of poor stress management in college students, effective stress reduction interventions for college students must be readily available on campus and in the community.

**Emotion Regulation**

While emotions can be adaptive and informative, they also have the potential to be maladaptive and potentially harmful when individuals cannot regulate and cope adaptively with their emotions. Emotion regulation can be defined as “a neutral process of modulating one’s emotional responses to the environment adaptively or maladaptively, in response to positive or negative emotion” (Finkelstein-Fox et al., 2018). Emotion regulation, which develops across the lifespan, becomes increasingly more critical as we age. As an individual enters adolescence, emerging adulthood, and eventually adulthood, emotion regulation becomes increasingly important— all while balancing more complex responsibilities.

Emotion regulation is a necessary skill for college students, as it is involved in many aspects of daily functioning such as perspective taking, reframing thoughts, interpersonal interactions,
communication, and emotional expression (Chambers et al., 2009; Cole et al., 2004; Gross & Muñoz, 1995). In first-year college students, the ability to develop and strengthen emotion regulation skills has been found to correlate with how well students adjust to the transition to college (Park et al., 2012). Additionally, there are associations between the ability to adaptively regulate one’s emotions and overall mental and physical health (Broderick & Metz, 2009; Desrosiers et al., 2013; Metz et al., 2013; Park et al., 2012). The inability to effectively regulate emotions has been linked to marked difficulty adjusting to college life, interpersonal dysfunction, difficulties with attention and memory, substance abuse, depression, anxiety, eating disorders, nonsuicidal self-injury, and poorer overall mental health outcomes (Chambers et al., 2009; Cole et al., 2004; Desrosiers et al., 2013; Park et al., 2012; Patel et al., 2018; Richards & Gross, 2000).

**Mindfulness**

Mindfulness is commonly conceptualized as intentional present moment awareness of internal and external happenings, along with an attitude of acceptance and nonjudgement (Bao et al., 2015; Gu et al., 2018; Kabat-Zinn, 1990). Mindfulness has been associated with a wide variety of mental, physical, and emotional health benefits (Bamber & Schneider, 2016; Grossman et al., 2004; Gu et al., 2018; Kabat-Zinn, 1990; Lynch et al., 2011; Lynch et al., 2018; Vidic & Cherup, 2019). Mindfulness interventions have been shown to decrease perceived stress and psychological distress and to increase emotion regulation, distress tolerance, and adaptive coping in adults (Desrosiers et al., 2013; Gawrysiak et al., 2016; Grossman et al., 2004; Halladay et al., 2019; McClintock, 2019; Robins et al., 2012; Virgili, 2015). Engaging in mindfulness activities and mindful coping styles may also increase an individual’s ability to identify and remain present with a range of emotional experiences and may aid in adaptive stress response and emotion regulation abilities (Finkelstein-Fox et al., 2018; Kumar et al., 2008).
Some benefits of mindfulness, such as improvements in emotion regulation and decreased perceived stress, align closely with some of the most common difficulties faced by college students. Mindfulness is also associated with decreased perceived stress, and better physical and psychological health in college students (Bao et al., 2015; Finkelstein-Fox, Greeson et al., 2014; Park, & Riley, 2018; Vidic & Cherup, 2019). Previous studies have examined the effectiveness of mindfulness training in a variety of higher education settings (de Vibe et al., 2013; Halladay et al., 2019; Lynch et al., 2011; Oman, et al., 2008; Ramler et al., 2015; Regehr et al., 2013; Rosenzweig et al. 2003; Shapiro et al., 2008; Shapiro, Schwartz, et al., 1998).

Specifically, reductions in stress, anxiety, sleep disturbances, and depression, as well as increased self-efficacy, resilience, and emotion regulation abilities and academic success have been found with use of mindfulness and meditation interventions in samples of college students (Greeson et al., 2014; Oman et al., 2008; Shapiro et al., 2008; Vidic & Cherup, 2019).

Mindfulness training has also reliably been shown to reduce stress and anxiety levels in medical and graduate students (de Vibe et al., 2013; Greeson et al., 2014; Rosenzweig et al., 2003; Shapiro, Schwartz, et al., 1998).

Although research has been done on the impacts of mindfulness on college students, relatively few of the interventions from these studies have been designed with the specific needs of emerging adults and college students such as financial and time constraints, developmental level, and the specific vulnerabilities of this age group in mind (Greeson et al., 2014). Given that emerging adulthood is a distinct developmental stage separate from adolescence and adulthood, consideration of the needs of this population when developing or implementing interventions is crucial.
A large portion of the research on the use of mindfulness interventions with college students has used interventions modelled on programs that were designed for adults, such as Mindfulness Based Stress Reduction (MBSR; Bamber & Schneider, 2016; Shapiro et al., 2008). Many of the current mindfulness-based interventions, including (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT), require considerable time and financial commitments that are often not practical for adolescents and young adults. Per the 2017 edition of the Mindfulness-Based Stress Reduction authorized curriculum guide, participants are required to participate in 31 hours of in class instruction over the course of eight weeks, and are instructed to engage in roughly one hour of mindfulness practice each day (Santorelli et al., 2017). Additionally, many mindfulness and meditation exercises are best completed in a quiet environment, especially for new practitioners who may have more difficulty with distractibility, and finding a quiet place to practice can prove difficult for students. Another potential barrier is that of privacy. Traditional college dorm rooms typically house two or more students per room, making it unlikely that college students will have privacy while they meditate. In addition to the potential for distraction while another person is in close proximity during meditation, it can also lead to the student feeling uncomfortable or embarrassed- making it less likely that they will engage in a daily practice for more than a few minutes at a time.

In addition to being impractical in regard to time and financial commitments, many college students demonstrate skepticism and resistance towards more traditional mindfulness interventions and reportedly find them too “new-agey” and spiritual (Rogers, 2013). Mindfulness programs that are specifically designed for adolescents or emerging adults are more likely to be accessible and engaging for young people, making it far more likely that they will incorporate the practice into their daily life. Interventions with the specific needs of emerging adults in mind
will also likely better support the growth and development of college students. Given the serious negative implications of stress and difficulties with emotion regulation for college students, it is imperative that further research is conducted on mindfulness interventions designed specifically for adolescents and emerging adults, and their use with college students.

While there is currently limited research on mindfulness interventions for adolescents and emerging adults and their use with college students, there are a small number of programs designed to meet the needs of this specific population. Koru, a mindfulness intervention designed for emerging adults, trains participants on “mind body skills” and “insight meditation practice” (Greeson et al., 2014; Rogers, 2013). This intervention consists of four 75-minute sessions and asks that participants dedicate ten minutes per day to an at home mindfulness practice. In a randomized control trial in a sample of undergraduate and graduate students, Koru was found to improve stress levels, sleep, mindfulness, and self-compassion among participants (Greeson et al., 2014).

Mindfulness-based Coping with University Life (MBCUL) is an eight-week group intervention for college students that is based on MBSR and MBCT (Lynch et al., 2011). This intervention consists of eight 90 minutes sessions, with an additional 4-hour silent meditation session that is typically held between the 6th and 7th session, and is designed to familiarize students with mindfulness meditation. The developers of this intervention distinguish MBCUL from other MBAs by incorporating mindful art and play and emphasizing flexibility within formal practice. They encourage participants to find small moments throughout the day to practice mindfulness in addition to a suggested 20-minute daily formal practice (Lynch et al., 2018).
Learning to Breathe

The Learning to BREATHE (L2B) program is another developmentally appropriate mindfulness intervention for adolescents, emerging adults, and college students. The program was developed by Patricia Broderick, a licensed clinical psychologist, certified school psychologist, certified school counselor, and researcher with training and experience with mindfulness interventions. This, combined with her expertise in both education and psychology made her uniquely qualified to understand both the developmental needs of students and the numerous benefits of mindfulness. This group-based mindfulness intervention has adapted elements from MBSR and was created around the developmental needs of adolescents, such as identity formation, autonomy, emotion regulation, and stress reduction. (Broderick, 2013, 2021; Broderick & Frank, 2014). The emphasis on identity formation, emotion regulation, and stress reduction pair well with the developmental and contextual needs of emerging adults and college students. Although Learning to BREATHE was developed for adolescents, it has previously been adapted for college students (Dvorakova, 2017; Kerr et al., 2017; Mahfouz et al., 2018).

The main objectives of the course, as outlined by Broderick, are:

1. To provide universal, developmentally appropriate mindfulness instruction that fosters mental health and wellness;
2. To enhance emotion awareness and emotion management skills and to foster wholesome emotional balance;
3. To strengthen attention;
4. To expand the repertoire of skills for stress management;
5. To help students integrate mindfulness into everyday life (Broderick, 2013, p.26)

Learning to BREATHE’s focus on enhanced emotional awareness, emotion management, and stress reduction fits well with some of the areas that are highly important to college students’
overall health and success. Learning to BREATHE was also developed to be “universally preventative” and empowering (Broderick, 2013). The prevention component of this intervention is an asset when considered in the context of college campuses, as many counseling centers are overwhelmed by the high numbers of students who seek services (Balon et al., 2015). This often leads to long waitlists or strict session limits. If Learning to BREATHE groups are offered on campuses as a preventative measure, it is possible that the focus on developing emotion regulation skills and stress reduction techniques through the use of mindfulness could ultimately reduce the number of students who require services from the campus counseling center.

This intervention can be delivered over the course of six, twelve, or eighteen sessions, but the same core lessons are covered regardless of which format is chosen. For example, in the eighteen-session protocol, the lessons and activities relevant to the ‘Body’ component of L2B might be covered over three 20-minute sessions. In the six-session protocol, each session typically lasts between 45-60 minutes. The remaining discussion of L2B will be related to the 6-session protocol. There are seven core themes in the Learning to BREATHE protocol, each represented by a letter in the word ‘breathe’. The themes are body, reflections, emotions, attention, tenderness, healthy habits, and empowerment (Broderick, 2013). This theme does not represent a formal session, but rather an overall goal of the L2B protocol.

In the six-session protocol, one theme is discussed each week. Each weekly one-hour session involves a brief introduction to the theme, followed by an in-session activity designed to facilitate a deeper understanding of the weeks’ material. Each session contains a brief formal mindfulness practice that is related to the weekly theme (Broderick, 2013). Group members are also given optional at-home activities to allow them further opportunity to practice new skills.
This mindfulness intervention has been shown to be effective in increasing emotion regulation abilities, and decreasing negative affect in adolescents (Broderick & Metz, 2009; Metz et al., 2013). In addition to the research showing the benefits of the L2B program in adolescents, this intervention has shown promising results in decreasing stress and increasing adaptive coping and life satisfaction in college students (Dvorakova et al., 2017; Mahfouz et al., 2018).

An additional benefit of the L2B program includes the existing qualitative data on college students’ perceptions of a modified version of the L2B intervention, Just Breathe. Students who participated in the Just Breathe group reported positive perceptions of the group, and common benefits from the program listed by participants included improvements in time management skills, interpersonal relationships, awareness of internal emotional states, and increased self-compassion (Mahfouz et al., 2018).

The comparably low cost of L2B is another benefit to this program. Becoming a certified instructor in many mindfulness interventions is costly and can take months to over a year to achieve. For example, prior to enrolling in a course to become an MBSR instructor, most courses will require a student to have participated (as a student) in an 8-week MBSR class with a 5-10 day silent retreat. This first step alone takes roughly two months and consists of a hefty financial commitment. Once enrolled in an MBSR certification course, there are several more stages that last several months. Trainees are also asked to attend at least one additional 5-10 day silent retreat. This type of financial and time requirement eliminates most potential facilitators who are not independently wealthy and who are not fortunate enough to have a job that allows for extended time off. This likely contributes to fewer interested candidates being able to complete these training courses, which in turn reduces the number of available facilitators to offer MBSR groups. In contrast, the Learning to BREATHE program is a much more cost-effective option for
persons seeking certification in mindfulness interventions. There are two training levels for L2B facilitators, a foundations workshop and an intensive training. These trainings, which are at times combined into an intensive workshop over the course of three days, are also significantly less expensive compared to many other mindfulness training programs.

While this intervention has been used with college students on a limited basis, there is a need for further research regarding the effect of L2B on college students’ emotion regulation skills and levels of perceived stress.

**Objectives of the Study**

This study aims to address the current research gaps in regards to mindfulness interventions that are designed to be developmentally appropriate for adolescents and emerging adults, and their use with college students. Specifically, the purpose of the current study is to examine the effects of a mindfulness intervention that is developmentally appropriate for adolescents and emerging adults, Learning to Breathe (L2B), on increasing emotion regulation abilities and decreasing perceived stress in college students. Currently, there is not enough research demonstrating the effectiveness of mindfulness programs that are specifically designed to be developmentally appropriate and accessible to college students.

Stress can impact physical, emotional, and cognitive health, all of which are crucial for academic success (Dusselier et al., 2005; Ross et al., 1999). Currently, there is limited research demonstrating the impacts of the Learning to BREATHE program on perceived stress levels in college students. I hypothesized that students in the mindfulness group will show a greater reduction in perceived stress between pre and posttest than the participants in the control group.
Research has also demonstrated that practicing mindfulness can lead to enhanced emotion regulation (Broderick & Metz, 2009; Metz et al., 2013; Robins et al., 2012) and distress tolerance (Gawrysiak et al., 2016). At present, there is not enough research on the benefits of mindfulness interventions specifically designed for adolescents and emerging adults on emotion regulation in college students. The second aim of this study is to explore the impact of the Learning to Breathe program on emotion regulation in college students. I hypothesized that students in the experimental group (the L2B group) will show greater improvements in scores of emotion regulation between pretest and posttest than students in the email control group.

In exploring the need for mindfulness interventions designed for adolescents and adapted for emerging adults, we will address the current lack of research regarding such interventions. While previous research has demonstrated mindfulness to be an effective intervention for decreasing perceived stress and increasing emotion regulation abilities in college students, our study will provide information about the effectiveness of the Learning to Breathe program for college students.

Chapter 3: Methods

Participants

Fifty college students at West Chester University were recruited to participate in this study on the effects of a mindfulness intervention on emotion regulation, positive and negative affect, and perceived stress in college students. Students were recruited from introductory psychology (Psych 100) classes. Early in the semester, researchers received permission from the professors of several, predetermined courses to provide students with information about the study during the first few minutes of each classes’ initial start times. A flyer with information
about the study (See Appendix A) was also distributed. Following a brief description of the study, interested students were asked to write down their contact information. All students who expressed interest in the study were then contacted and provided with further details about the study (such as exclusion criteria and the day and time of the in-person mindfulness group). The inclusion criteria for the study stated that participants must be between the ages of 18 and 30 years of age, and must have normal or corrected to normal hearing and vision. The rationale for requiring participants to have normal or corrected to normal vision and hearing was related to a working memory task (which is not reported in this study) that measures response times and accuracy- both of which can be affected by how well a participant can perceive the information. In order for participants to be able to participate in the in-person mindfulness group, they were required to be available from 2:00-3:30 on Tuesday afternoons.

Interested students were asked to respond with their age, if they had normal or corrected to normal vision and hearing, and if they were available from 2:00-3:30 on Tuesday’s during the Fall 2019 semester. Students who were selected to participate in the study were assigned to the experimental or control group based on their availability. Twenty-five students were assigned to each group. One student dropped out of the study due to a family emergency before they could attend their pretesting session, and another student dropped out of the study after they completed their pretesting session. Both students were part of the in-person mindfulness group.

Measures

Demographic Information

Participants were asked to provide demographic information (See Appendix B) such as their gender, age, race/ethnicity, year in college, whether or not they were a psychology major,
and if they had previous mindfulness training. Participants who endorsed having previous mindfulness training were then prompted with the following message and provided space to type their answer: “Please explain your previous training in mindfulness meditation. For instance, what was the name of the training program, was it a part of a yoga class, how many sessions and/or how long was the training, where did you receive the training, techniques you learned etc. Answer as many of the questions as you can, and add any more information you think is important”.

Once data collection was completed, identifying information such as name, WCU ID number, email address, cell phone number and birth date were removed from the dataset and stored in a secure location on a password protected computer in Wayne Hall. After demographic information was collected, participants were shown the following message: “Thank you for your participation in this study. Some of the questions you will be asked will sound similar to one another. Each individual question is important so even if it seems repetitious, please answer each one carefully. Keep in mind, too, that there are no right or wrong answers to any of the questions. What’s important is answering in a way that reflects how you really feel.”

**Emotion Regulation**

Emotion Regulation is an important skill, especially for emerging adults and college students. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), was used to assess emotion dysregulation (See Appendix C). This 36 item measure yields scores for six subscales: non-acceptance of emotional responses (e.g., “When I’m upset, I become embarrassed for feeling that way”), difficulties engaging in goal-related behavior (e.g., “When I’m upset, I have difficulty focusing on other things”), impulse control difficulties (e.g., “I
experience my emotions as overwhelming and out of control”), lack of emotional awareness (e.g., “I pay attention to how I feel”), limited access to emotion regulations strategies (e.g., “When I’m upset, I believe that there is nothing I can do to make myself feel better”), and lack of clarity about emotions (e.g., “I have no idea how I am feeling”) (Gratz & Roemer, 2004). The DERS has been found to be psychometrically sound, with test-retest reliability of .88, and internal consistency (Cronbach’s alpha) reported at .93 for the total score and with all subscales above .80 (Gratz & Roemer, 2004).

**Stress**

College students are at risk of experiencing high levels of perceived stress. In this study, a short-form version of the Perceived Stress Scale (PSS; Cohen & Williamson, 1988) was used to measure the participants’ levels of perceived stress at both pretest and posttest (See Appendix D). This ten-item measure is easy to read and understand, and asks general questions about stress levels in a way that is not specific to any particular demographic group (e.g., “In the last month, how often have you felt that you were unable to control the important things in your life?”). The psychometrics for the ten-item short-form version of the PSS have been shown to be sound and reliable, with a review conducted by Lee (2012) indicating that the internal consistency (Cronbach’s alpha) was greater than .70 for all 12 studies that were reviewed (Cronbach’s alpha levels ranged from .74 - .91).

**Design**

This study was approved by the West Chester University Institutional Review Board (IRB). See Appendix E for the IRB approval letter. All research assistants were trained on the lab policies, attended a training on how to collect cortisol assays and to administer the questionnaires. All research assistants provided up-to-date certifications from the Collaborative
Institutional Training Initiative (CITI) for Social and Behavioral Responsible Conduct of Research.

Our study was a quasi-experimental design (due to the use of convenience sampling of students on campus), and the assignment of participants to either the experimental or control group based on their provided availability. The total sample consisted of 48 students who were enrolled in an introductory psychology class: 23 in the Learning to Breathe (L2B) mindfulness group and 25 in the email education control group.

Instead of using a waitlist control group, an email education control group was used as a way to further demonstrate that engaging in an in person Learning to Breathe group is involved in the changes seen at posttest, and not just the introduction of information about mindfulness. The email education control group consisted of easy-to-read e-newsletters crafted by the research team from a variety of popular mindfulness publications that contained information about mindfulness, such as Greater Good Magazine, Mindfulness Magazine, and Breathe Magazine. The decision to include information from popular mindfulness publications rather than scholarly articles was made in the hopes that the reading material would be accessible to college students who (for the most part) had no prior mindfulness experience. Prior to sending out the newsletters, two researchers with experience in practicing mindfulness and meditation reviewed the information for clarity and accuracy. These newsletters were emailed to the participants in the control group on the same days as the in-person mindfulness groups. Participants completed pretesting before the start of the intervention and then completed post-testing within two weeks of the end of the mindfulness intervention. In this study, the effects of a mindfulness intervention on positive and negative affect, emotion regulation, and perceives stress were examined. Additional data on compassion, self-compassion, rumination, interpersonal reactivity, life
satisfaction, positive and negative affect, cognitive assessments of working memory, and salivary cortisol samples were also collected but will not be discussed in this paper.

Pre and post-testing were conducted with all participants. Between groups differences were measured by looking at the experimental and control group at post-testing. Within groups differences were measured between pretest and posttest for each group.

Procedure

Pretest

Once participants were scheduled for a pretesting session, they were sent a confirmation email with the date and time of their pretest session, along with instructions for how to find the location of the lab. Participants were sent a reminder email 24 hours before their pretesting session.

The pretest and posttest conditions included one researcher and one participant. Once participants arrived at the lab, they were met by a researcher who asked that they leave their items by the door and turn off their phones to avoid distractions. Participants were then asked to read and sign a consent form (see Appendix F) that listed relevant information about the study, possible risks and benefits, and contact information for the principal investigators. Once participants completed the consent form, they were then seated at a computer where they followed a link to a Qualtrics survey where they provided demographic information and completed several questionnaires, including the Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004) and the Perceived Stress Scale (PSS; Cohen & Williamson, 1988). Following completion of the surveys, participants were thanked for their time, given a sheet with instructions for the next phase of the study (See Appendix G), and were told they would be contacted in several weeks to schedule their posttesting session.
**Intervention**

Participants were divided into two groups: an in-person mindfulness group and an email education control group. The participants in the email education control group were emailed a weekly easy-to-read e-newsletters crafted by the research team. These newsletters were sent to participants in the control group on the same day of the week that the Learning to BREATHE groups were held.

The in-person mindfulness group consisted of six weekly one-hour group sessions, and the email education control group received a weekly mindfulness newsletter that was emailed to them on the same day that the in-person group met. The mindfulness group utilized the Learning to Breathe (L2B) protocol and was run by a trained group facilitator and a graduate student assistant. Each of the weekly sessions covered one of the letters in BREATHE, with the last letter (E for empowerment) being an overarching goal of the program rather than a weekly session. The first theme for week one was ‘Body’. This module focuses on present moment awareness, and awareness of the breath and bodily sensations. The second theme, ‘Reflections’, focuses on thoughts. This module focuses on creating awareness of thoughts and techniques to handle their thoughts with mindfulness. The third theme is ‘Emotions’. Topics such as emotional awareness and expression were covered in this module. The fourth theme is ‘Attention’. This module focuses on promoting attention and awareness to bodily, emotional, and cognitive experiences as a way promote stress management. The fifth theme is ‘Tenderness’. This module focuses on kindness, self-compassion, and gratitude. The sixth theme is ‘Healthy Habits’. This module focuses on habits that promote wellbeing and strategies for continued mindfulness in the students’ daily lives (Broderick, 2014).
Each week participants were provided with information about the theme of the week, engaged in an activity related to the material for the week, and were given information about optional activities they could try at home to further practice the skills that were discussed in the group.

During the fall 2019 semester, the L2B sessions were facilitated by Deborah Soderland, a former WCU graduate student who has experience facilitating L2B groups. Deborah has been practicing mindfulness for roughly 12 years, and has completed a one-week Mindfulness Based Stress Reduction teacher training with Jon Kabat-Zinn and Saki Santorelli and participated in an L2B trainer workshop with the program’s developer.

**Posttest**

During the post-testing session, participants followed the same procedure as pretesting. Upon arriving for their post-testing session, participants were greeted by a researcher and asked to confirm their names. Researchers then matched the participants’ names to the confidential code that was assigned to them at pretesting. Participants were then asked to take several surveys, all of which were the same as at pretesting. Following the completion of all experimental tasks, participants were then given a debriefing sheet (see Appendix H), asked if they had any questions, reminded of the contact information for the principal investigators, and given their gift card. Participants were also told that they would be automatically assigned their research credits. Post testing sessions took roughly one hour. Participants were compensated with a 20-dollar gift card and two research credits for their Psych 100 class upon completion of the study.
Chapter 4: Results

Prior to running any analyses, the data was checked to ensure that data had been entered correctly and that no data was missing. Descriptive statistics were used to provide information about participants’ demographic factors and Mann-Whitney U test and Chi Square tests were used to investigate if there were significant differences between the experimental and control groups at pretest. Next, several variables were transformed to correct violations of normality. Two Way Mixed ANOVAs were used to investigate the potential interactions between time (pre and post test) and group (experimental and control). All analyses were conducted using SPSS 27. This process is discussed in more detail below.

An a priori power analysis was conducted. Assuming an effect size of .37, which was based on a rough average from previous learning to breathe literature, along with an alpha of .05, we needed a sample size of 60 to reach a power of 0.8 (Broderick & Metz, 2009; Cohen, 1992; Eva & Thayer, 2017; Faul et al., 2009; Kerr et al., 2017). The current study analyzed data from 48 participants. With the same assumed effect size and our sample size of 48, we estimated that our power would be .71 (Faul et al., 2009).

Descriptive Statistics

Descriptive statistics performed on the demographic information that was collected from participants at pretesting indicated that participants in the study ranged in age from 18-24. The mean age of participants was 18.71 (SD = 1.18). Twenty-nine participants were 18 years old when they completed their pretesting session (60%), 11 were 19 years old (22%), four were 20 years old (8 %), three were 21 years old (6.25%), and one participant was 24 years old (2.08%). None of the participants were 22 or 23 years old at the time of their pretest session. 11
participants identified as male (22.9%) and 37 participants identified as female (77.1%). None of the participants identified their gender as “other”.

Thirty seven of the 48 participants who completed both pre and post-testing self-identified as White/Caucasian (77%), six of the 48 participants self-identified as Hispanic/LatinX (12.5%), three participants self-identified as “Other” (6.25%), two of the participants self-identified as Black/African American (4%), and none of the participants self-identified as Asian (0%). Thirty-two participants were in their freshman year (66.66%), 11 were in their sophomore year (22.91%), four were in their junior year (8.33%), and one was in their senior year (2.08%). None of the participants selected the “Fifth Year” or “Other” option when asked about their academic year. Five participants endorsed previous mindfulness training (10.41%).

Initially both the experimental and control group contained 25 participants. One student dropped out of the study due to a family emergency before they could attend their pretesting session, and another student dropped out of the study after they completed their pretesting session. Both students who dropped out of the study were in the experimental group and the final number of participants in the experimental group was 23 (49.7%). There were 25 (52.08%) participants in the control group.

The means and standard deviations for each of the dependent variables are displayed in Table 1. The Dependent variables for this study included emotion regulation (as assessed by the DERS Total, Nonacceptance, Goals, Impulse, Awareness, Strategy, and Clarity subtests), and perceived stress (as measured by the perceived stress scale score). Refer to Appendix I for the mean and standard deviations for all subscales separated by group at pretest and posttest.
Table 1

 Distribution of Dependent Variables at Pretest and Posttest

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean</th>
<th>SD</th>
<th>Measure</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>DERS Total Pre</td>
<td>83.67</td>
<td>17.79</td>
<td>DERS Total Post</td>
<td>78.56</td>
<td>23.83</td>
</tr>
<tr>
<td>DERS Nonacceptance Pre</td>
<td>13.37</td>
<td>5.54</td>
<td>DERS Nonacceptance Post</td>
<td>12.33</td>
<td>5.56</td>
</tr>
<tr>
<td>DERS Goals Pre</td>
<td>16.17</td>
<td>4.85</td>
<td>DERS Goals Post</td>
<td>14.63</td>
<td>4.96</td>
</tr>
<tr>
<td>DERS Impulse Pre</td>
<td>10.40</td>
<td>3.34</td>
<td>DERS Impulse Post</td>
<td>10.77</td>
<td>4.26</td>
</tr>
<tr>
<td>DERS Awareness Pre</td>
<td>15.37</td>
<td>4.37</td>
<td>DERS Awareness Post</td>
<td>13.77</td>
<td>4.42</td>
</tr>
<tr>
<td>DERS Strategy Pre</td>
<td>17.56</td>
<td>6.66</td>
<td>DERS Strategy Post</td>
<td>16.33</td>
<td>6.83</td>
</tr>
<tr>
<td>DERS Clarity Pre</td>
<td>10.79</td>
<td>2.87</td>
<td>DERS Clarity Post</td>
<td>10.73</td>
<td>3.97</td>
</tr>
<tr>
<td>PSS Total Pre</td>
<td>18.06</td>
<td>6.45</td>
<td>PSS Total Post</td>
<td>17.46</td>
<td>7.61</td>
</tr>
</tbody>
</table>

Inferential Statistics

Inferential statistics were used to determine if there were differences in the distribution of demographic variables between the experimental and control groups at pretest.

Comparison Between Intervention Groups on Sociodemographic

A chi-square test of independence was used to determine if there were significant differences between the experimental and control groups in regards to gender, race, academic year, and previous mindfulness experience at pretest.

Gender. A chi-square test of independence was conducted between gender and intervention group. The crosstabs for gender are listed in table 2 below. All expected cell frequencies were greater than five. There was not a statistically significant association between gender and intervention group, \( \chi^2(1) = 3.52, p = .061 \). The association was small (Cohen, 1988), Cramer’s V = .271. While there was no evidence that there were statistically significant differences between the groups on gender, the results were trending towards significance.
Table 2

*Crosstabs for Gender between Experimental and Control*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental (N)</th>
<th>Control (N)</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Female</td>
<td>15</td>
<td>22</td>
<td>37</td>
</tr>
</tbody>
</table>

**Race.** A chi-square test of independence was conducted between race and intervention group. The crosstabs for race are listed in table 3 below. Six cell frequencies were less than five. There was not a statistically significant association between race and intervention group, $\chi^2(3) = 2.28, p = .516$. The association was small (Cohen, 1988), Cramer’s $V = .218$.

Table 3

*Crosstabs for Race between Experimental and Control*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental (N)</th>
<th>Control (N)</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>18</td>
<td>19</td>
<td>37</td>
</tr>
<tr>
<td>Hispanic/LatinX</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Black/African American</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

**Academic Year.** A chi-square test of independence was conducted between academic year and intervention group. The crosstabs for Academic year are listed in table 4 below. Four cell frequencies were less than five. After reviewing these results, this variable was viewed from an ordinal perspective (i.e. year 1, year 2, etc.) rather than a nominal perspective (i.e. freshman, sophomore) and a Mann-Whitney U test was conducted. See the Mann-Whitney U section below for the results.
Table 4

*Crosstabs for Academic Year between Experimental and Control*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental (N)</th>
<th>Control (N)</th>
<th>Total (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>18</td>
<td>14</td>
<td>32</td>
</tr>
<tr>
<td>Sophomore</td>
<td>3</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Junior</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Senior</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The distribution of academic year for both the experimental and control group violated normality, as assessed by Shapiro Wilk’s test (p<.001). The Mann-Whitney U test is often used as a nonparametric alternative to an independent samples t-test to determine if there are differences between groups.

A Mann-Whitney U test was run to determine if there were differences in academic year between participants in the experimental and control groups at pretest. Distributions of academic year for the experimental and control groups were similar, as assessed by visual inspection. Academic year was not statistically significantly different between experimental (Mdn = 1) and control (Mdn = 1), U = 349, z = 1.526, p = .127.

Three of the participants in the experimental group (13.04%), and 2 participants in the control group (8%), endorsed previous mindfulness experience. There was not a statistically significant association (p = .660, two-sided Fishers exact test). The association was small (Cohen, 1988), Cramer’s V = .082.

**Age.** The distribution of age for both the experimental and control group violated normality, as assessed by Shapiro Wilk’s test (p<.001). The Mann-Whitney U test is often used as a nonparametric alternative to an independent samples t-test to determine if there are
differences between groups. A Mann-Whitney U test was run to determine if there were
differences in age between participants in the experimental and control groups at pretest.

Distributions of age for the experimental and control groups were similar, as assessed by
visual inspection. Age was not statistically significantly different between experimental ($Md = 18$) and control groups ($Md = 18$), $U = 347.5, z = 1.414, p = .157$.

In summary, the results of the Mann Whitney U test and Chi Squared tests did not
provide evidence that there were significant differences in age, gender, race, year in school, and
previous mindfulness experience between the experimental and control group at pretest.

**Rationale for Selection of Remaining Analyses**

A two-way mixed ANOVA was selected to examine the changes in scores of emotion
regulation and perceived stress between the experimental and control condition from pretest to
posttest. A two-way mixed ANOVA was chosen due to the inclusion of both between and within
subjects variables, and dependent variables that were measured at the continuous level.

This analysis was chosen instead of a MANOVA due to the desire to examine the impact of
the L2B intervention on each dependent variable, rather than its relation to the combination of
dependent variables (Laerd Statistics, 2016; Tabachnick & Fidell, 2019). Our small sample size
was also a factor in the decision to run a two-way mixed ANOVA rather than a MANOVA, as
univariate analyses are considered to be preferential over multivariate analyses when a study has
a small sample size (Tabachnick & Fidell, 2019).

As such, the six DERS subscales were analyzed using a two-way mixed ANOVA, assuming
the criteria for normality is met. Because an acceptable nonparametric alternative to a two-way
mixed ANOVA has not been identified, any of the total scores or subscales that violated
normality were assessed to determine if they were a good fit for a transformation. All variables
that were transformed were evaluated again after the transformation to determine if the transformation was beneficial. Any transformations that were not beneficial were discarded and the original data was used for the two-way mixed ANOVA since this analysis is robust to violations of normality (Laerd Statistics, 2016). A Bonferroni Correction or Bonferroni Type Adjustment was not conducted in this study because multiple analyses were not conducted on each dependent variable, thus the need to adjust for a Type I error was not deemed necessary (Statistics Solutions, 2021). Also, a Bonferroni Correction may have increased the likelihood of a Type II error (Statistics Solutions, 2021). If a Bonferroni Correction was conducted and a Type II error did occur, a reduction in statistical power would also occur, which would further reduce the statistical power of this study that was already somewhat low due to the number of participants (Statistics Solutions, 2021).

Although a follow up analysis consisting of an ANCOVA to determine if previous mindfulness experience was a covariate was initially proposed, there were not enough participants who endorsed previous mindfulness experience in the experimental (N=3) or control (N=2) groups to run an ANCOVA.

**Evaluations of Assumptions for two Way Mixed ANOVAs**

Preliminary analyses of the dependent variables in preparation for the two-way mixed ANOVA were conducted. Upon review of these analyses, it was determined that several variables violated normality.

After discovering that several variables violated normality, alternative courses of action were investigated. As there is no acceptable non parametric alternative for the 2-way mixed ANOVA, the options were to run transformations or simply note the violation and continue on with the
two-way mixed ANOVA (Laerd Statistics, 2015). After reviewing all options, the decision was made to run transformations on the variables that violated normality.

First, the data was checked again by hand to ensure that data entry errors were not the cause of the outliers or violations to normality. No data entry errors were found. Tabachnick & Fidell (2019), indicate that when running transformations, z scores should be used as cutoff scores in determining which type of transformation to run. Tabachnick & Fidell (2019) identified cutoff scores of +/- 1.96, +/- 2.24, and +/- 2.58 to be used for selecting moderate, strong, and extreme transformation procedures respectively.

It is important to note that when conducting a transformation, if any category or level of a dependent variable (i.e., experimental, control, pretest, posttest) violates normality, the entire variable is considered to be in violation (Laerd Statistics, 2013).

In total there were seven variables that violated normality. It is important to note that although the DERS Impulse data violated normality at pretest and posttest, after reviewing the data it was determined that the z score for the DERS impulse did not meet the threshold for transformation set by Tabachnick & Fidell (2019). The two-way mixed ANOVA was conducted with the original data from this variable, as it is generally robust against deviations from normality (Kim 2013; Laerd Statistics, 2015).

Per the cutoff points listed above, the remaining six variables were transformed using the ‘extreme positive’ transformation procedure, as described in Laerd’s guide on Transformations using SPSS Statistics (2013). This procedure involved applying an inverse transformation. Refer to Appendix J for the Shapiro Wilk and outliers for the untransformed and transformed data at pretest and posttest.
**DERS Total**

Because the DERS Total posttest violated normality both the DERS Total pre and post were transformed prior to analyses. After running the transformation, there were no outliers and the data was normally distributed, as assessed by Shapiro-Wilk’s test of normality (p > .05). Prior to the transformation, the DERS Total post data violated normality, and there were three outliers (one in the experimental group and two in the control group). After running the transformation, the data was normally distributed, as assessed by Shapiro-Wilk’s test of normality (p > .05). There was one remaining outlier in the control group, as assessed by boxplot. After reviewing the data before and after the transformation, there was a clear benefit in transforming the DERS Total data. As such, the transformed data was used for the two-way mixed ANOVA. It is important to note that after analyses were completed with the transformed variables, the means and confidence intervals were back transformed for a meaningful interpretation of the data.

**DERS Nonacceptance**

Prior to the transformation of the DERS Nonacceptance Pre data, there were several outliers in the control group. The data was not normally distributed, as assessed by Shapiro Wilk’s test of normality (p < .05). After running the transformation, there were six outliers, as assessed by boxplot. The data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (p < .05).

Prior to the transformation the DERS Nonacceptance Post data, there were two outliers in the experimental group, and one in the control group. The data was not normally distributed, as assessed by Shapiro Wilk’s test of normality (p < .05). After running the transformation, there
were no outliers, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk’s test of normality (p > .05).

Although running the transformation did not eliminate the violation of normality in the pretest data, the transformation did positively impact the outliers and violation of normality in the posttest data and the decision was made to use the transformed version of this variable for the purposes of the two-way mixed ANOVA. It is important to note that after analyses were completed with the transformed variables, the means and confidence intervals were back transformed for a meaningful interpretation of the data.

**DERS Awareness**

Prior to the transformation the DERS Awareness Pre data was normally distributed with one outlier in the experimental group. A transformation of the DERS Awareness Pre was run due to the need to run a transformation on the DERS Awareness Post data. After running the transformation, there were three outliers and the data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (p < .05).

Prior to the transformation the DERS Awareness Post data, there was one outlier in the control group. The data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (p < .05). After running the transformation, there were 3 outliers, as assessed by boxplot. The data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (p < .05).

Transforming the DERS Awareness data did not fix the violation of normality in the posttest data, and it negatively impacted the normality of the pretest data and led to additional outliers. Due to the negative impact of the transformation on the data, the decision was made to
discontinue the use of the transformed data for this variable and to run the two-way mixed ANOVA with the original data.

**DERS Strategy**

Prior to the transformation the DERS Strategy Pre data was normally distributed with no outliers. After running the transformation, there were no outliers and the data was normally distributed, as assessed by Shapiro-Wilk’s test of normality (p > .05).

Prior to transforming the data, the DERS Strategy Post data there were two outliers in the experimental group. The data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (p < .05). After running the transformation, there were no outliers, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk’s test of normality (p > .05).

Transforming the variable did not have any negative effects on the DERS Strategy pretest data. Based on the positive effect the transformation had on the outliers and normality of the posttest data the decision was made to use the transformed data for the purposes of the two-way mixed ANOVA. It is important to note that after analyses were completed with the transformed variables, the means and confidence intervals were back transformed for a meaningful interpretation of the data.

**DERS Clarity**

Prior to the transformation the DERS Clarity Pre data was normally distributed with three outliers. After running the transformation, there were seven outliers and the data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (p < .05).
Prior to the transformation the DERS Clarity Post data was not normally distributed, and there were five outliers. After running the transformation there were two outliers, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk’s test of normality (p > .05).

Although transforming this variable allowed for normality in the post testing data, the transformation led to four additional outliers and new violations of normality in both the experimental and control group for the pretest data. Because the pretest data was so negatively impacted by the transformation the decision was made to discontinue the use of the transformed data for this variable and to use the original data or the two-way mixed ANOVA.

**PSS Total**

Prior to the transformation the Perceived Stress Scale pre there was one outlier. The data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (p < .05). After running the transformation, there were three outliers, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk’s test of normality (p > .05).

Prior to the transformation, the Perceived Stress Scale post data contained three outliers as assessed by boxplot. The data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (p < .05). After running the transformation, there were no outliers, as assessed by boxplot.

Although transforming this variable allowed for normality in the pretesting data, the transformation led to an additional outlier in the experimental group at posttest and negatively impacted the normality of the experimental group at posttest. As the transformation did not solve the issue of normality for both groups and led to negative changes in the normality of the
experimental group at posttest the decision was made to discontinue the use of the transformed data for this variable and to use the original data or the two-way mixed ANOVA.

**Interaction and Main Effects**

*Two Way Mixed ANOVA DERS Total*

As mentioned above, normality and outliers were assessed prior to running the transformations. Given issues with normality and outliers, the data was transformed. Following the transformation, the DERS total data met normality, as assessed by Shapiro-Wilk. While there was one outlier remaining in the post test data for the control group after transforming the data, running a two-way mixed ANOVA was determined to be the best course of action given that two-way mixed ANOVAs are considered robust against deviations from normality (Kim, 2013; Laerd Statistics, 2015).

The remaining assumptions are now discussed. There was homogeneity of variances (p > .05) and covariances (p = .403), as assessed by Levene’s test of homogeneity of variances and Box’s M test, respectively. Mauchly’s test of sphericity indicated that the assumption of sphericity was automatically met since there was only two time periods.

There was a statistically significant interaction (see Figure 1) between the intervention and time on DERS Total scores, $F(1, 46) = 4.618, p = .037$, partial $\eta^2 = .091$.

It is important to note that after analyses were completed with the transformed variables, the means and confidence intervals were back transformed for a meaningful interpretation of the data.
After determining there was a statistically significant interaction between group and time, further analyses were run to determine if there were simple main effects for group and time. Using nontransformed data, nonparametric alternatives were used to assess for simple main effects for group (using the Mann-Whitney U test) and time (using the Wilcoxon Signed Rank Test).

**Mann-Whitney U for DERS Total Pre**

A Mann-Whitney U test was run to determine if there were differences in DERS Total scores at pretest between the experimental and control groups. Distributions of the DERS total scores for both groups at pretest were similar, as assessed by visual inspection. Median DERS Total Pretest score was not statistically significantly lower in the experimental (Mdn = 83) group compared to the control (Mdn = 83) group, $U = 269.5$, $z = -0.372$, $p = .355$. 

---

**Figure 1**

*Estimated Marginal Means of DERS Total Back Transformed* 

![Graph showing estimated marginal means of DERS Total Back Transformed](image-url)
**Mann-Whitney U for DERS Total Post**

A Mann-Whitney U test was run to determine if there were differences in DERS Total scores at posttest between the experimental and control groups. Distributions of the DERS total scores for both groups at posttest were similar, as assessed by visual inspection. Median DERS Total Posttest score was not statistically significantly lower in the experimental (Mdn = 72) in comparison to the control (Mdn = 81) group, \( U = 362, z = 1.538, p = .062 \). However, there was a trend towards a significant difference (\( p < .10 \)).

**Wilcoxon Signed Rank Test for DERS Total Experimental Group**

A Wilcoxon Signed Rank Test was run to determine if there were differences in DERS Total scores between pretest and posttest for the experimental group. The difference scores were approximately symmetrically distributed, as assessed by a histogram with superimposed normal curve. Data are medians unless otherwise stated. Of the 23 participants in the experimental group, 18 participants saw reductions in their DERS Total scores between pretest and posttest, and 5 participants saw increases in their DERS Total scores between pretest and posttest. There was a statistically significant median decrease in DERS total scores (9) in the experimental group between pretest (83) and posttest (72), \( z = -2.891, p = .002 \).

**Wilcoxon Signed Rank Test for DERS Total Control Group**

A Wilcoxon Signed Rank Test was run to determine if there were differences in DERS Total scores between pretest and posttest for the control group. The difference scores were approximately symmetrically distributed, as assessed by a histogram with superimposed normal curve. Data are medians unless otherwise stated. Of the 25 participants in the control group, 16
participants saw reductions in their DERS Total scores between pretest and posttest, and nine participants saw increases in their DERS Total scores between pretest and posttest.

There was no statistically significant median decrease in DERS total scores (2) in the control group at pretest (83) compared to posttest (81), $z = -0.471, p = .318$.

Two Way Mixed ANOVA DERS Nonacceptance

As mentioned above, normality and outliers were assessed prior to running the transformations. While data collected at posttest was normally distributed with no outliers, the data collected at pretest contained several outliers and was not normally distributed. Transforming this variable did not help to correct the issues. As there is no acceptable nonparametric alternative for this analysis and because the two-way mixed ANOVA is considered to be robust against deviations from normality, we decided to run the two-way mixed ANOVA (Kim 2013; Laerd Statistics, 2015).

The remaining assumptions are now discussed. There was homogeneity of variances ($p > .05$) as assessed by Levene’s test of homogeneity of variances. There was not equality of covariances ($p = .033$), as assessed by Box’s M test. Despite a violation in the equality of covariances, it is often true that a two-way mixed ANOVA is run anyways with the violation being noted (Laerd Statistics, 2015). Mauchly’s test of sphericity indicated that the assumption of sphericity was automatically met since there was only two time periods.

There was not a statistically significant interaction (see Figure 2) between the intervention and time on DERS Nonacceptance scores, $F (1, 46) = .000071, p = .993$, partial $\eta^2 = .000002$. 
It is important to note that after analyses were completed with the transformed variables, the means and confidence intervals were back transformed for a meaningful interpretation of the data.

**Figure 2**

*Estimated Marginal Means of DERS Nonacceptance Back Transformed*

After determining there was not a statistically significant interaction between intervention and time for the DERS Nonacceptance subscale, the main effects were investigated. The mean, confidence interval, and standard error are listed in Table 5 below. The main effect of time across groups did not show a statistically significant difference in DERS Nonacceptance scores between pretest and posttest, $F (1, 46) = 1.637, p < .207$, partial $\eta^2 = .034$. 

![Estimated Marginal Means of DERS Nonacceptance Back Transformed](image_url)
Table 5

*Mean, Confidence Interval, and Standard Error for Time, DERS Nonacceptance*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>13.35 (11.73-14.97)</td>
<td>.805</td>
</tr>
<tr>
<td>Posttest</td>
<td>12.29 (10.68-13.92)</td>
<td>.803</td>
</tr>
</tbody>
</table>

The main effect of group showed that there was not a statistically significant difference in mean DERS Nonacceptance scores between intervention groups \( F (1, 46) = 3.346, p = .074, \) partial \( \eta^2 = .068. \) The mean, confidence interval, and standard error are listed in table 6 below.

Table 6

*Mean, Confidence Interval, and Standard Error for Intervention Group, DERS Nonacceptance*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>12.152 (10.15-14.15)</td>
<td>.995</td>
</tr>
<tr>
<td>Control</td>
<td>13.50 (11.57-15.42)</td>
<td>.954</td>
</tr>
</tbody>
</table>

*Two Way Mixed ANOVA DERS Goals*

As mentioned above, normality and outliers were assessed prior to running the two-way mixed ANOVA. There was one outlier in the experimental group at posttest, as assessed by boxplot. The data was normally distributed, as assessed by Shapiro-Wilk’s test of normality \( (p > .05) \). There was homogeneity of variances \( (p > .05) \) and covariances \( (p = .083) \), as assessed by Levene’s test of homogeneity of variances and Box’s M test, respectively. Mauchly’s test of sphericity indicated that the assumption of sphericity was automatically met since there was only
two time periods. There was not a statistically significant interaction (see Figure 3) between the intervention and time on DERS Goals scores, $F(1, 46) = 3.685, p = .061$, partial $\eta^2 = .074$. However, there was a trend towards interaction ($p < .10$).

**Figure 3**

*Estimated Marginal Means of DERS Goals*

![Graph showing estimated marginal means of DERS Goals](image)

After determining there was not a statistically significant interaction between intervention and time for the DERS Goals subscale, the main effects were investigated. The mean, confidence interval, and standard error are listed in table 7 below. The main effect of time across groups showed a statistically significant difference in DERS Goals scores between pretest and posttest, $F(1, 46) = 5.767, p < .020$, partial $\eta^2 = .111$. 
The main effect of group across time showed that there was not a statistically significant difference in mean DERS Goals scores between intervention groups, $F(1, 46) = .075, p = .786$, partial $\eta^2 = .002$. The mean, confidence interval, and standard error are listed in table 8 below.

### Table 8

**Mean, Confidence Interval, and Standard Error for Intervention Group, DERS Goals**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>15.22 (13.39-17.04)</td>
<td>.91</td>
</tr>
<tr>
<td>Control</td>
<td>15.56 (13.81-17.31)</td>
<td>.87</td>
</tr>
</tbody>
</table>

**Two Way Mixed ANOVA DERS Impulse**

As mentioned above, normality and outliers were assessed prior to running the two-way mixed ANOVA. The data was not normally distributed at pretest or posttest, as assessed by Shapiro-Wilk’s test of normality ($p < .05$). Despite this, the decision was made to move forward with the two-way mixed ANOVA, given that this type of analysis is rather robust against deviations from normality (Kim 2013; Laerd Statistics, 2015) There were no outliers, as assessed by boxplot. There was homogeneity of variances ($p > .05$) and covariances ($p = .239$), as
assessed by Levene’s test of homogeneity of variances and Box’s M test, respectively. Mauchly’s test of sphericity indicated that the assumption of sphericity was automatically met since there was only two time periods.

There was not a statistically significant interaction (see Figure 4) between the intervention and time on DERS Impulse scores, $F(1, 46) = 3.689, p = .061$, partial $\eta^2 = .074$. However, there was a trend towards interaction ($p < .10$).

**Figure 4**

*Estimated Marginal Means of DERS Impulse*

After determining there was not a statistically significant interaction between intervention and time for the DERS Impulse subscale, the main effects were investigated. The mean, confidence interval, and standard error are listed in table 9 below. The main effect of time did not show statistically significant difference in DERS Impulse scores between pretest and posttest, $F(1, 46) = .808, p = .373$, partial $\eta^2 = .017$. 

Table 9

*Mean, Confidence Interval, and Standard Error for Time, DERS Impulse*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>10.40 (9.41-11.38)</td>
<td>.488</td>
</tr>
<tr>
<td>Posttest</td>
<td>10.74 (9.51-11.97)</td>
<td>.610</td>
</tr>
</tbody>
</table>

The main effect of group showed that there was not a statistically significant difference in mean DERS Impulse sores between intervention groups, $F(1, 46) = .513, p = .477$, partial $\eta^2 = .011$. The mean, confidence interval, and standard error are listed in table 10 below.

Table 10

*Mean, Confidence Interval, and Standard Error for Intervention Group, DERS Impulse*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>10.29 (8.69-11.71)</td>
<td>.750</td>
</tr>
<tr>
<td>Control</td>
<td>10.94 (9.49-12.39)</td>
<td>.719</td>
</tr>
</tbody>
</table>

Two Way Mixed ANOVA DERS Awareness

As mentioned above, normality and outliers were assessed prior to running the transformations. Given issues with normality and outliers, the data was transformed. Prior to the transformation, the DERS Awareness Pre data was normally distributed with one outlier. After running the transformation, there were three outliers and the data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality ($p < .05$). After transforming the DERS
Awareness Post data, there were still 3 outliers and the data was not normally distributed. Because running the transformation did not correct the errors in the post test data (and negatively impacted the pre data) we chose to use the original data for this variable without transformation.

There was homogeneity of variances (p > .05) and covariances (p = .115), as assessed by Levene’s test of homogeneity of variances and Box’s M test, respectively. Mauchly’s test of sphericity indicated that the assumption of sphericity was automatically met since there was only two time periods.

There was not a statistically significant interaction (see Figure 5) between the intervention and time on DERS Awareness scores, $F(1, 46) = 2.081, p = .156$ partial $\eta^2 = .043$.

**Figure 5**

*Estimated Marginal Means of DERS Awareness*
After determining there was not a statistically significant interaction between intervention and time for the DERS Awareness subscale, the main effects were investigated. The mean, confidence interval, and standard error are listed in table 11 below. The main effect of time showed that there was a statistically significant difference in DERS Awareness scores between pretest and posttest, $F (1, 46) = 7.434, p = .009$, partial $\eta^2 = .139$.

**Table 11**
*Mean, Confidence Interval, and Standard Error for Time, DERS Awareness*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>15.38 (14.09-16.66)</td>
<td>.64</td>
</tr>
<tr>
<td>Posttest</td>
<td>13.81 (12.54-15.08)</td>
<td>.63</td>
</tr>
</tbody>
</table>

The main effect of group showed that there was not a statistically significant difference in mean DERS Awareness scores between intervention groups, $F (1, 46) = .828, p = .368$, partial $\eta^2 = .018$. The mean, confidence interval, and standard error are listed in table 12 below.

**Table 12**
*Mean, Confidence Interval, and Standard Error for Intervention Group, DERS Awareness*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>15.11 (13.46-16.75)</td>
<td>.82</td>
</tr>
<tr>
<td>Control</td>
<td>14.08 (12.51-15.66)</td>
<td>.78</td>
</tr>
</tbody>
</table>
**Two Way Mixed ANOVA for DERS Strategy**

As mentioned above, normality and outliers were assessed prior to running the transformations. Given issues with normality and outliers, the data was transformed. Following the transformation, there were no outliers, as assessed by boxplot, and the DERS Strategy data was normally distributed, as assessed by Shapiro-Wilk’s test of normality (p > .05). There was homogeneity of variances (p > .05) and covariances (p = .815), as assessed by Levene’s test of homogeneity of variances and Box’s M test, respectively. Mauchly’s test of sphericity indicated that the assumption of sphericity was automatically met since there was only two time periods.

There was a statistically significant interaction (see Figure 6) between the intervention and time on DERS Strategy scores, $F (1, 46) = 8.55$, $p = .005$, partial $\eta^2 = .157$.

It is important to note that after analyses were completed with the transformed variables, the means and confidence intervals were back transformed for a meaningful interpretation of the data.
After determining there was a statistically significant interaction between group and time, further analyses were run to determine if there were simple main effects for group and time. Using nontransformed data, nonparametric alternatives were used to assess for simple main effects for group (using the Mann Whitney) and time (using the Wilcoxon).

**Mann-Whitney U for DERS Strategy Pre**

A Mann-Whitney U test was run to determine if there were differences in DERS Strategy scores at pretest between the experimental and control groups. Distributions of the DERS Strategy scores for both groups at pretest were similar, as assessed by visual inspection. Median DERS Strategy pretest score was not statistically significantly lower in the experimental (Mdn = 17) group compared to the control (Mdn = 14) group, \( U = 235, \ z = -1.086, \ p = .138 \).

**Mann-Whitney U for DERS Strategy Post**
A Mann-Whitney U test was run to determine if there were differences in DERS Strategy scores at posttest between the experimental and control groups. Distributions of the DERS Strategy scores for both groups at posttest were similar, as assessed by visual inspection. Median DERS Strategy posttest score was not statistically significantly lower in the experimental (Mdn = 14) in comparison to the control (Mdn = 15) group, \( U = 338, z = 1.046, p = .148 \).

**Wilcoxon Signed Rank Test for DERS Strategy Experimental Group**

A Wilcoxon Signed Rank Test was run to determine if there were differences in DERS Strategy scores between pretest and posttest for the experimental group. The difference scores were approximately symmetrically distributed, as assessed by a histogram with superimposed normal curve. Data are medians unless otherwise stated. Of the 23 participants in the experimental group, 16 participants saw reductions in their DERS Strategy scores between pretest and posttest, and 5 participants saw increases in their DERS Strategy scores between pretest and posttest. Two participants in the experimental group saw no change between their pretest and posttest scores. There were statistically significant reductions in median DERS Strategy scores (2) between pretest (17) and posttest (14) for the experimental group, \( z = -2.846, p = .002 \).

**Wilcoxon Signed Rank Test for DERS Strategy Control Group**

A Wilcoxon Signed Rank Test was run to determine if there were differences in DERS Strategy scores between pretest and posttest for the control group. The difference scores were approximately symmetrically distributed, as assessed by a histogram with superimposed normal curve. Data are medians unless otherwise stated. Of the 25 participants in the control group, 10 participants saw reductions in their DERS Strategy scores between pretest and posttest, and 11
participants saw increases in their scores between pretest and posttest. Four participants in the control group saw no change between their pretest and posttest scores. There was no statistically significant reduction in median DERS Strategy scores between pretest (14) and posttest (15) for the control group (-1), \( z = .402, p = .344 \).

**Two Way Mixed ANOVA for DERS Clarity**

As mentioned above, normality and outliers were assessed prior to running the transformations. the DERS Clarity data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality (\( p < .05 \)), and several outliers were observed. Transforming this variable did not help to correct the issues, and as there is no acceptable nonparametric alternative for this analysis, we decided to run the two-way mixed ANOVA given that this type of analysis has been shown to be robust against deviations from normality (Kim 2013; Laerd Statistics, 2015). The remaining assumptions are now discussed. There was homogeneity of variances (\( p > .05 \)) and covariances (\( p = .174 \)), as assessed by Levene’s test of homogeneity of variances and Box’s M test, respectively. Mauchly’s test of sphericity indicated that the assumption of sphericity was automatically met since there was only two time periods.

There was not a statistically significant interaction (see Figure 7) between the intervention and time on DERS Clarity scores, \( F (1, 46) = .060, p = .808 \), partial \( \eta^2 = .001 \).
After determining there was not a statistically significant interaction between intervention and time for the DERS Clarity subscale, the main effects were investigated. The mean, confidence interval, and standard error are listed in table 13 below. The main effect of time showed that there was not a statistically significant difference in DERS Clarity scores between pretest and posttest, $F(1, 46) = .020, p = .889$, partial $\eta^2 = .000$.

**Table 13**

*Mean, Confidence Interval, and Standard Error for Time, DERS Clarity*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>10.82 (9.99-11.65)</td>
<td>.411</td>
</tr>
<tr>
<td>Posttest</td>
<td>10.76 (9.61-11.91)</td>
<td>.571</td>
</tr>
</tbody>
</table>
The main effect of group showed that there was not a statistically significant difference in mean DERS Clarity scores between intervention groups, $F (1, 46) = 1.924, p = .172$, partial $\eta^2 = .040$. The mean, confidence interval, and standard error are listed in table 14 below.

**Table 14**

*Mean, Confidence Interval, and Standard Error for Intervention Group, DERS Clarity*

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>11.41 (10.10-12.73)</td>
<td>.65</td>
</tr>
<tr>
<td>Control</td>
<td>10.16 (8.90-11.42)</td>
<td>.63</td>
</tr>
</tbody>
</table>

**Two Way Mixed ANOVA for Perceived Stress**

As mentioned above, normality and outliers were assessed prior to conducting the two-way mixed ANOVA. The Perceived Stress Scale data was not normally distributed, as assessed by Shapiro-Wilk’s test of normality ($p < .05$), and several outliers were observed. Transforming this variable did not help to correct the issues, and as there is no nonparametric alternative for this analysis, we decided to run the two-way mixed ANOVA given that this type of analysis has been shown to be robust against deviations from normality (Kim 2013; Laerd Statistics, 2015). The remaining assumptions are now discussed. There was not homogeneity of variances for PSS Pre ($p = .012$). There was homogeneity of variances for PSS Post ($p > .05$) as assessed by Levene’s test of homogeneity of variances. There was also homogeneity of covariances ($p = .056$), as assessed by Box’s M test. Since the assumption of homogeneity of variance were not met and transforming the dependent variable did not resolve the issue, the two-way mixed ANOVA was still conducted as there is no appropriate robust alternative available (Laerd
Mauchly’s test of sphericity indicated that the assumption of sphericity was automatically met since there was only two time periods. There was not a statistically significant interaction (see figure 8) between the intervention and time on Perceived Stress scores, \( F(1, 46) = 2.429, p = .126, \) partial \( \eta^2 = .050. \)

**Figure 8**

*Estimated Marginal Means of Perceived Stress Scale (PSS)*

After determining there was not a statistically significant interaction between intervention and time for the PSS, the main effects were investigated. The main effect of time showed that there was not a statistically significant difference in PSS scores between pretest and posttest, \( F(1, 46) = .412, p = .524, \) partial \( \eta^2 = .000. \) The mean, confidence interval, and standard error are listed in table 15 below.
Table 15

*Mean, Confidence Interval, and Standard Error for Time, PSS*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>18.08 (16.19-19.97)</td>
<td>.94</td>
</tr>
<tr>
<td>Posttest</td>
<td>17.41 (15.19-19.62)</td>
<td>.63</td>
</tr>
</tbody>
</table>

The main effect of group showed that there was not a statistically significant difference in mean PSS sores between intervention groups, $F(1, 46) = .183$, $p = .671$, partial $\eta^2 = .004$. The mean, confidence interval, and standard error are listed in table 16 below.

Table 16

*Mean, Confidence Interval, and Standard Error for Intervention Group, PSS*

<table>
<thead>
<tr>
<th></th>
<th>Mean (95% CI)</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>17.37 (14.82-19.92)</td>
<td>1.27</td>
</tr>
<tr>
<td>Control</td>
<td>18.12 (15.68—20.57)</td>
<td>1.21</td>
</tr>
</tbody>
</table>
Chapter 5: Discussion

While there has been a great deal of research on the use of mindfulness interventions in adults, considerably less attention has been focused on the use of mindfulness interventions in other populations. This study aimed to investigate the impacts of the Learning to Breathe program on emotion regulation and perceived stress in a sample of college students.

There were several steps in the data analysis plan for the current study. Descriptive analyses that were run on demographic information collected at pretest determined there were no significant differences between the experimental and control groups. Next, several variables were transformed to correct violations of normality. Two-way mixed ANOVA’s were used to investigate the potential interaction of group and time on eight dependent variables (The DERS total scores and the scores accompanying six subscales as well as scores from the PSS). For results that did not indicate a significant interaction effect, the main effects were investigated to determine if there were significant differences between the experimental and control groups or between pretest and posttest. For results that did indicate a significant interaction effect, appropriate follow up analyses were conducted.

The results of this study support the hypothesis that students in the Learning to Breathe group will show greater improvements in scores of emotion regulation than students in the control group. In regards to overall emotion regulation scores (as assessed by the DERS total), significant reductions were demonstrated for students in the Learning to Breathe group between pretest and posttest, and there was a significant interaction between the experimental and control group. Our results are consistent with previous literature on the benefits of mindfulness on emotion regulation (Broderick & Metz, 2009, Hill & Updegraff, 2012; Kerr et al., 2017; Roemer et al., 2015). These results add to the literature on the use of mindfulness interventions in college
students and the benefits on the use of Learning to Breathe on emotion regulation in college students.

There was a statistically significant interaction between the intervention and time on DERS Strategy scores. Additionally, there were statistically significant reductions in median DERS Strategy scores between pretest and posttest for the experimental group. These findings are also in line with previous research demonstrating significant reductions in difficulties with emotion regulation strategies in adolescents after participating in a Learning to BREATHE group (Broderick & Metz, Metz et al., 2013).

Interaction effects between intervention and time on DERS Impulse scores, although not statistically significant, were trending towards a significant interaction. In fact, although the mean score for DERS Impulse dropped from 10.39 at pretest to 10.00 at posttest for the experimental group, the mean score increased from 10.40 at pretest to 11.48 in posttest for the control group. This suggests that while the L2B group did not significantly reduce difficulties with impulse control in the experimental group, it may have aided in the prevention of these difficulties from becoming somewhat more pronounced.

Interaction effects between intervention and time on DERS Goals scores, although not statistically significant, was on the cusp of statistically significant reductions in difficulties engaging in goal directed behavior when distressed. There was a statistically significant reduction in DERS Goals scores between pretest and posttest (main effect), with greater reductions noted in the experimental group.

Although the results above seem to support the hypothesis that the Learning to BREATHE group would show greater reduction in overall difficulties with emotion regulation,
there were no significant interaction effects found for the DERS Nonacceptance, DERS Awareness, and DERS Clarity subscales.

Contrary to our hypothesis, the results of this study do not support the hypothesis that students in the Learning to Breathe group will show more reduction in perceived stress than the students in the control group. This is in contrast to previous research, which has demonstrated significant reductions in perceived stress after the learning to BREATHE intervention (Eva et al., 2017; Fung et al., 2019; Metz & Broderick, 2013).

**Research Implications**

There are several important implications of this study. First, the present study adds to the literature on mindfulness interventions that are developmentally appropriate for use with college students. The current study also adds to the literature on the use of the Learning to BREATHE program with emerging adults. While this intervention was initially developed for use with adolescents, the findings of this study provide further support for the use of this intervention in college students.

Given the risk of potential negative physical and mental health outcomes for college students without adequate emotion regulation abilities and coping skills, the results of this study provide preliminary support that the use of the Learning to BREATHE group could be an effective intervention to promote emotion regulation and adaptive coping in college students.

The use of an email education control group rather than a waitlist control (or having no control group) also has implications. Instead of using a waitlist control group, an email education control group was used as a way to further demonstrate that engaging in an in person Learning to Breathe group is involved in the changes seen at posttest, and not just the introduction of information about mindfulness.
Clinical Implications

Research has shown that the transition to college is a vulnerable period, and that individuals who are between the ages of 18-23 (an age range that many college students fit in) are at high risk for mental illness (Greeson et al., 2014; Regehr, Glancy, & Pitts, 2013; Ruberman, 2014). The results of this study indicate that the Learning to BREATHE program is effective at reducing overall emotion regulation difficulties and increasing adaptive coping. There is strong evidence to suggest that emotion regulation abilities are connected to mental health outcomes, interpersonal relationships, and academic and occupational success (Desrosiers et al., 2013; Gross & Muñoz, 1995; Loskot, 2019; Park et al., 2012; Patel et al., 2018). For college students, emotion regulation skills are a vital component to success. Learning to BREATHE gives college students access to an affordable resource that can buffer against the risk factors in place for them by teaching them more adaptive coping skills and emotion regulation strategies.

Heightened stress levels, pressure to do well academically, and occasional interpersonal conflict are all common experiences for many college students, and being able to cope adaptively with these experiences is crucial for success (Dusselier et al., 2005; Dyson & Renk, 2006; Kang et al., 2009; Mahfouz et al., 2018). The DERS Strategy subscale is intended to measure the level of difficulty an individual is having in utilizing effective emotion regulation strategies (i.e. coping skills) when they are feeling upset or distressed (Gratz & Roemer, 2004). Given the serious negative implications of failing to use adaptive coping skills during college (such as reduced GPA, interpersonal difficulties, increased risk for substance use, and a host of other negative physical and mental health outcomes), it is very encouraging that the results of this
study demonstrated a significant interaction between group and time for the DERS Strategy subtest. These results provide further support for the use of Learning to BREATHE as a mindfulness group on college campuses.

Many college counseling centers are overwhelmed by the number of students who request help and are not able to provide ample resources to support all students who are in need of mental health services (Balon et al., 2015; Halladay et al., 2019; LeViness et al., 2019). Offering Learning to BREATHE, which is intended as a preventative intervention, on campus could promote emotion regulation and increase adaptive coping in students who participate, which could in turn allow for more students to receive help while also reducing the burden on counseling centers.

Despite the steady increase in utilization of mental health resources on campus, there is still a large treatment gap for many students who need mental health services but are not getting them (Balon et al., 2015; Halladay et al., 2019; Hunt & Eisenberg, 2010). While there are several possible explanations for why this might occur, two that come to mind are lack of available resources and stigma. It is possible that the Learning to BREATHE program could help with both. If the problem is lack of available resources, the L2B group could serve as a nonclinical offshoot to therapy groups. Students who come to the counseling center who do not report high levels of distress or who are looking for skills-based groups to promote wellbeing (rather than seeking treatment for a mental health concern) could be directed to the group to free up resources in the counseling center and reduce the amount of time students spend on a waiting list before receiving services. In regards to the issue of stigma, it is possible that students who are in need of coping skills or support might be more willing to attend a mindfulness group rather than counseling. Assuming some students find the L2B group helpful, they may be more open to
attending similar groups, or even group therapy, in the future. For students who attend the group and are experiencing clinically significant levels of distress that are more appropriate to be handled by the counseling center, it is possible that attending this group and making connections with the group facilitator and other students could provide a valuable opportunity to recommend the counseling center or for the student to ask questions about what ‘more help’ might look like. For this to work, the facilitators would need to be informed about the counseling center (where it is and what they offer). This is in no way suggesting that the facilitator should be responsible for ‘catching’ students who are experiencing a high level of distress, but rather that the meaningful connections that are often formed in mindfulness groups might provide an opportunity for a conversation that would not have happened otherwise.

Additionally, while this group is not intended to serve as or replace therapy, it is possible that this intervention could be seen as a preventative measure. If all incoming freshman were given the opportunity to be in a Learning to BREATHE group it could allow students to learn new coping and self-regulation skills immediately upon transition to college. By providing students with this valuable experience early in their transition, it is possible that the skills learned in the group could prevent difficulties down the line. In addition to arming students with coping and regulation skills, another benefit of the learning to BREATHE group is the group format. This format allows for a large group of students to benefit from the program (as opposed to individual therapy where clinicians can only see one person per hour), making it both cost effective and efficient at reaching large numbers of students. The group format also provides students with the opportunity to build social support and engage in meaningful social interactions with their peers.
Having effective interventions that provide college students with coping skills that they are likely to use is critical if we hope to improve the academic and mental health outcomes for college students. As such, the Learning to Breathe should be considered for implementation on college campuses.

**Limitations and Future Research**

This study has several limitations. First, the participants were recruited from only one university, and our participants were a convenience sample. Additionally, the demographics of our participants (as well as at the university overall) were rather homogenous, with 77% of our participants self-identifying as Caucasian and the majority of participants self-identifying as female. It is possible that these factors may limit the generalizability of our results. Future studies should include a more heterogeneous sample from several universities.

As mentioned above, the experience of emerging adulthood is considered to be inherently heterogeneous. It is possible that the heterogeneous nature of emerging adulthood may also limit the generalizability of the results of this study.

The results of this study provide preliminary support for the use of Learning to BREATHE with college students. After running this experiment during the Fall 2019 semester we hoped to add 50 more participants to the data set by running the same procedure again during the Fall 2020 semester. Unfortunately, due to a global pandemic we were unable to offer the L2B group or do in person research. Due to the small sample size, we were limited in the analyses we could run and our power was lower. It is also possible that the small sample size and reduced power may have impacted the results of this study. Specifically, the lack of significant interaction between intervention and time for the Perceived Stress Scale stood out as unusual, as several other studies have demonstrated reductions in perceived stress scores after the implementation of
Learning to BREATHE. Further research with a larger sample size is needed to provide a strong evidence base in support of the use of L2B as a low-cost intervention on college campuses. One way to address this would be to train additional group facilitators, or offer the same group several times a week. It will be important for future research to continue to balance the desire for a large sample size with the need to keep each group at a manageable level as it is possible that having too many participants in one group could negatively impact the experience for participants.

An additional consideration for future research is the timing of post testing. It is possible that having the posttest sessions so close to finals week swayed our results, especially in regards to the Perceived Stress Scale. Comparing pretest data from a relaxed point in the semester and then posttest at such a high stress period may not give an accurate reflection of the benefits of the group. It is also important to consider that a large portion of our participants were first semester freshman who were experiencing their first set of college final exams, potentially making the weeks posttesting were conducted even more stressful than exam season for more experienced students.

Although a follow up analysis consisting of an ANCOVA to determine if previous mindfulness experience was a covariate was initially proposed, there were not enough participants who endorsed previous mindfulness experience in the experimental (N=3) and control (N=2) groups to run an ANCOVA. Future research should investigate previous mindfulness experience as a possible covariate.

Another limitation is that while we collected a significant amount of demographic and self-report data from our participants, we did not assess for trauma or mental health history. It is possible that participants with a history of trauma may have exhibited more difficulties with
emotion regulation and higher perceived stress at various points in the semester. It is also possible that these students could have had a different response to the intervention (whether that be more or less benefit) than participants without a trauma history. Similarly, students with mental health diagnoses (such as Generalized Anxiety Disorder, Major Depressive Disorder, Bipolar Disorder, etc.) may have experienced different levels of emotion regulation difficulties, perceived stress, and benefits from the intervention.

In the present study, for participants to be assigned to the experimental group they were required to be available from 2:00-3:00pm on Tuesdays in order to attend the group sessions. This requirement limited the researcher’s ability to use truly random assignment. It is important to note that not all participants who were available during the group were assigned to the experimental condition. While some may view the assignment of participants as a limitation because it is not a random assignment, we argue that it is also a strength. Dodge (2014), argues that testing interventions in real world contexts is an important step that is often forgone in research. The present study demonstrates the use of Learning to BREATHE in a real-world context that considers the scheduling needs and time constraints of college students.

Additionally, standards for effectiveness research published by Gottfredson and colleagues (2015) states “The intervention should be delivered under the same types of conditions as one would expect in the community institutions where such interventions are most likely to be situated during scale-up.” (p.8). The methods used in this study allowed for participants to engage with the intervention on campus with all of their typical daily constraints. Also, analyses demonstrated that the groups were similar at baseline so the assignment of participants based on real world context did not sway the group demographics.
The use of an email education control group is a strength of the current study. However, in the current study researchers did not have a way to gauge how much participants were engaging with the mindfulness newsletters. Future research that uses a similar model for a control group should consider collecting data on how engaged the control group was with the mindfulness newsletters, and if these participants were engaged in any mindfulness activities between pretest and posttest. Collecting this data will allow researchers to gain a clearer understanding of the benefits of the Learning to Breathe group.

Future research should also investigate alternatives to in person delivery of the L2B group. While we do not yet know the full impact of the pandemic, it is clear that the COVID-19 pandemic led to an increase in mental health difficulties in many populations. Future research should investigate the feasibility of doing L2B remotely. Such research would also help populations with chronic illness and mobility needs who may not always be able to attend in person interventions.

Conclusion

The results of this study provide encouraging results regarding utilization of mindfulness interventions, in particular L2B, that are a part of academic curriculum as a potential way of benefiting the students. University settings are encouraged to consider utilizing mindfulness-based courses as a part of students' academic curriculum.
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Opportunity to Fulfill your Psy 100/120 Research Requirement!

Participate in a study which involves a six-week mindfulness program and on completion you will receive 2 research credits as well as a $20 Amazon gift card.

As part of this study, you would be randomly assigned to either a group that participates in a six week, in-person mindfulness training program or a six week email information program about mindfulness. You will also be asked to fill out questionnaires about your stress and emotions, do computer tests of memory and math, and give saliva samples to measure a stress hormone. In order to participate in the study, you must be 18-30 years old and have normal or corrected to normal vision.

*Your participation would be purely voluntary, and you can stop participating at any time without any negative consequences.

If you are interested in participating, email L2B@wcupa.edu
Appendix B
Demographics Questionnaire

Thank you for your interest in the mindfulness study. Please complete the following questions.

Name (first and last):

WCU ID Number:

WCU Email:

Cell Phone Number:

What is your gender?

- Male
- Female
- Other

What is your age?

What is your date of birth?
  Month:
  Day:
  Year:

What time did you wake up today?

What is your race/ethnicity?

- Black/ African American
- Hispanic/ LatinX
- Asian
- Native American
- White/ Caucasian
- Other

What is your academic level?

- Freshman
- Sophomore
- Junior
- Senior
- Fifth year student
- Other
Are you a Psychology Major?
- Yes
- No

Do you have previous training in mindfulness meditation?
- Yes
- No

If Yes: Please explain your previous training in mindfulness meditation. For instance, what was the name of the training program, was it a part of a yoga class, how many sessions and/or how long was the training, where did you receive the training, techniques you learned etc. Answer as many of the questions as you can, and add any more information you think is important.
Appendix C
Difficulties in Emotion Regulation Scale

Difficulties in Emotion Regulation Scale (DERS)

Please indicate how often the following statements apply to you by writing the appropriate number from 1 to 5 on the line beside each one:

1) I am clear about my feelings (R)
2) I pay attention to how I feel (R)
3) I experience my emotions as overwhelming and out of control
4) I have no idea how I am feeling
5) I have difficulty making sense out of my feelings
6) I am attentive to my feelings
7) I know exactly how I am feeling
8) I care about what I am feeling
9) I am confused about how I feel
10) When I’m upset, I acknowledge my emotions
11) When I’m upset, I become angry with myself for feeling that way
12) When I’m upset, I become embarrassed for feeling that way
13) When I’m upset, I have difficulty getting work done
14) When I’m upset, I become out of control
15) When I’m upset, I believe that I will remain that way for a long time
16) When I’m upset, I believe that I’ll end up feeling very depressed
17) When I’m upset, I believe that my feelings are valid and important
18) When I’m upset, I have difficulty focusing on other things
19) When I’m upset, I feel out of control
20) When I’m upset, I can still get things done
21) When I’m upset, I feel ashamed with myself for feeling that way
22) When I’m upset, I know that I can find a way to eventually feel better
23) When I’m upset, I feel like I am weak
24) When I’m upset, I feel like I can remain in control of my behaviors
25) When I’m upset, I feel guilty for feeling that way
26) When I’m upset, I have difficulty concentrating
27) When I’m upset, I have difficulty controlling my behaviors
28) When I’m upset, I believe that there is nothing I can do to make myself feel better
29) When I’m upset, I become irritated with myself for feeling that way
30) When I’m upset, I start to feel very bad about myself
31) When I’m upset, I believe that “wallowing” (i.e., remaining stuck) in it is all I can do
32) When I’m upset, I lose control over my behaviors
33) When I’m upset, I have difficulty thinking about anything else
34) When I’m upset, I take time to figure out what I’m really feeling
35) When I’m upset, it takes me a long time to feel better
36) When I’m upset, my emotions feel overwhelming
Appendix D
Perceived Stress Scale

Perceived Stress Scale [10 item]
For each question choose from the following alternatives:

0. Never
1. Almost Never
2. Sometimes
3. Fairly Often
4. Very Often

1) In the last month, how often have you been upset because of something that happened unexpectedly?

2) In the last month, how often have you felt that you were unable to control the important things in your life?

3) In the last month, how often have you felt nervous and “stressed”?

4) In the last month, how often have you felt confident about your ability to handle your personal problems?

5) In the last month, how often have you felt that things were going your way?

6) In the last month, how often have you found that you could not cope with all the things that you had to do?

7) In the last month, how often have you been able to control irritations in your life?

8) In the last month, how often have you felt that you were on top of things?
9) In the last month, how often have you been angered because of things that were outside of your control?

10) In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
Appendix E
IRB Approval Letter

TO: Geeta Shivde, Sandra Kerr, Susan Gans
FROM: Nicole M. Cattano, Ph.D.
Co-Chair, WCU Institutional Review Board (IRB)
DATE: 8/19/2019

Project Title: Measuring the Outcomes of the Learning to BREATHE Mindfulness Training Program
Date of Approval: 8/19/2019

☒ Expedited Approval
This protocol has been approved under the new updated 45 CFR 46 common rule that went into effect January 21, 2019. As a result, this project will not require continuing review. Any revisions to this protocol that are needed will require approval by the WCU IRB. Upon completion of the project, you are expected to submit appropriate closure documentation. Please see www.wcupa.edu/research/irb.aspx for more information.

Any adverse reaction by a research subject is to be reported immediately through the Office of Research and Sponsored Programs via email at irb@wcupa.edu.

Signature:

Co-Chair of WCU IRB

WCU Institutional Review Board (IRB)
IORG#: IORG0004242
IRB#: IRB00005030
FWA#: FWA00014155

West Chester University is a member of the State System of Higher Education
Appendix F

Consent Form

Project Title: Measuring the Outcomes of the Learning to BREATHE Mindfulness Training Program

Investigator(s): Geeta Shivde; Sandra Kerr; Susan Gans

Project Overview:

Participation in this research project is voluntary and is being done by Geeta Shivde, Sandra Kerr and Susan Gans as part of their Faculty-Directed Research to find out whether a mindfulness training program can have positive impacts on undergraduate students stress and emotions. If you participate in the in-person mindfulness sessions, your time commitment would be about 8 hours over eight weeks. If you are participating in the email mindfulness program, your time commitment would be about 5 hours over eight weeks. As part of the study you will be asked to do a computer test of memory and math ability, submit several saliva samples to measure a stress hormone, participate in a six week mindfulness program in which you will either meet weekly in a group or receive an email newsletter about mindfulness and you will receive $20 Amazon gift card dollars as well as 2 research credits towards the Introductory Psychology course requirement. There is a minimal risk associated with the study. Thinking and writing about your emotions and any stressors you are experiencing may on rare occasions, cause some emotional upset or distress. There is 1) the opportunity to experience participating in a psychological study; 2) the knowledge that you are contributing to research that may lead to a better understanding of cognitive functioning, emotions, stress, and methods for reducing the impact of stress both psychologically and biologically; 3) learning a new method for coping with stress that has documented effectiveness to you as the participant, and this research will help Research like this may lead to more effective strategies for helping college students deal with stress.

The research project is being done by Geeta Shivde and Sandra Kerr and Susan Gans as part of their Faculty-Directed Research to find out whether a mindfulness training program can have positive impacts on undergraduate students. If you would like to take part, West Chester University requires that you agree and sign this consent form.

You may ask Geeta Shivde any questions to help you understand this study. If you don’t want to be a part of this study, it won’t affect any of your studies from West Chester University. If you choose to be a part of this study, you have the right to change your mind and stop being a part of the study at any time.

1. What is the purpose of this study?
   - To find out whether a mindfulness training program can have positive impacts on undergraduate students’ stress and emotions

2. If you decide to be a part of this study, you will be asked to do the following:
   - fill out questionnaires about your mood, stress and emotion
   - Do a computer test of memory and math ability
o submit several saliva samples to measure a stress hormone
o participate in a six week mindfulness program in which you will either meet weekly in a group or receive an email newsletter about mindfulness
o This study will take from 5-8 hours of your time over about eight weeks

3. **Are there any experimental medical treatments?**
   o No

4. **Is there any risk to me?**
   o There are minimal anticipated side effects or risks associated with the study. Thinking and writing about your emotions and any stressors you are experiencing may on rare occasions, cause some emotional upset or distress.
   o If you experience significant upset from the study procedures, you can contact Dr. Geeta Shivde or Dr. Sandra Kerr
   o If you experience discomfort, you have the right to withdraw at any time.

5. **Is there any benefit to me?**
   o Benefits to you may include: 1) the opportunity to experience participating in a psychological study; 2) the knowledge that you are contributing to research that may lead to a better understanding of cognitive functioning, emotions, stress, and methods for reducing the impact of stress both psychologically and biologically; 3) learning a new method for coping with stress that has documented effectiveness
   o Research like this may lead to more effective strategies for helping college students deal with stress

6. **How will you protect my privacy?**
   o The session will not be recorded.
   o Your records will be private. Only Geeta Shivde, Sandra Kerr, Susan Gans and the IRB will have access to your name and responses.
   o Your name will not be used in any reports.
   o Records will be stored:
     ▪ in a locked cabinet in Wayne Hall Room 538, which will also be kept locked.
     ▪ Password Protected File/Computer
   o Any personal identification will be removed from questionnaires, surveys, saliva samples or computer data and will be replaced by a code number to make sure your data is anonymous.
   o Records will be destroyed Three Years After Study Completion

7. **Do I get paid to take part in this study?**
   o You get $20 Amazon gift card dollars in the form of 2 research credits towards the Introductory Psychology course requirement

8. **Who do I contact in case of research related injury?**
   o For any questions with this study, contact:
     ▪ **Primary Investigator:** Geeta Shivde at 610-436-3207 or gshivde@wcupa.edu
     ▪ **Secondary Investigator:** Sandra Kerr at 610-436-2549 or skerr@wcupa.edu

9. **What will you do with my Biospecimens?**
   o Your biospecimens will not be used or distributed for future research studies.
For any questions about your rights in this research study, contact the ORSP at 610-436-3557.

I, _________________________________ (your name), have read this form and I understand the statements in this form. I know that if I am uncomfortable with this study, I can stop at any time. I know that it is not possible to know all possible risks in a study, and I think that reasonable safety measures have been taken to decrease any risk.

______________________________

Subject/Participant Signature Date:______________

______________________________

Witness Signature Date:______________
Appendix G

Information for Participants In the Mindfulness Study

Information for Participants in the Mindfulness Study

You have finished the Pre-testing portion of the Mindfulness Study.

In order to complete the study, see the instructions below.

If you are in the Mindfulness Training Group:

Attend the mindfulness training sessions weekly on Tuesdays from 2-3:15 from Oct. 1 to Nov. 5. You will receive an email reminder with the time and location of the training sessions.

We will also schedule you to come in for the post-testing session sometime in November.

If you are part of the email education Group:

You will receive weekly emails with information about mindfulness meditation starting in the first week of October.

We will contact you to schedule a post-testing session at some point in November to complete the study.

If you have any questions about the study, please email L2Blab@wcupa.edu

or Dr. Shivde gshivde@wcupa.edu
Appendix H

Debriefing Form

Project Title: Measuring the Outcomes of the Learning to BREATHE Mindfulness Training Program

Investigator(s): Dr. Geeta Shivde; Dr. Sandra Kerr; Dr. Susan Gans (Psychology Department, West Chester University)

This study was designed to measure the effects of participating in a six-week mindfulness meditation program called Learning to BREATHE. This program was originally developed by Dr. Patricia Broderick (professor emerita, West Chester University) to be a research-based mindfulness curriculum created for classroom or group settings. In the current study there were two groups of participants. You were either in the Learning to BREATHE group that met weekly in person, or the active control group who had a weekly email newsletter with information about mindfulness. We are hoping to find out whether the Learning to BREATHE program improves mood and emotion regulation, and reduces stress as measured by cortisol levels in your saliva. We also asked you to complete a cognitive test to measure your working memory and executive functions at the beginning and the end of the study.

If you are interested in finding out more about the Learning to BREATHE program, you can visit this site:

https://learning2breathe.org/

WCU also has many mindfulness programs offered through the Contemplative Studies Center:

https://www.wcupa.edu/healthSciences/contemplativeStudies/

If you have any questions about the study, please contact Dr. Shivde gshivde@wcupa.edu

You are receiving an Amazon gift card as partial compensation for your participation. We will also inform your psychology course instructor that you have completed your 2 required research credits for the semester.

Thank you for participating!
# Appendix I

Mean and Standard Deviations for all Subscales Separated by Group at Pretest and Posttest

<table>
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<tr>
<th></th>
<th>Intervention Group</th>
<th>Mean</th>
<th>SD</th>
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<td><strong>DERS Total Pre</strong></td>
<td>Experimental</td>
<td>85.04</td>
<td>19.37</td>
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<td></td>
<td>Control</td>
<td>82.40</td>
<td>16.48</td>
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<td><strong>DERS Total Post</strong></td>
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<td>Control</td>
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Appendix J

Shapiro Wilk and Outliers for the Transformed and Untransformed Variables at Pretest and Posttest

DERS Total Pre

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