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IMPACT OF MINDFULNESS TRAINING ON TEST ANXIETY IN COLLEGE STUDENTS

By

Lindsay E. Alcock

Honors Scholarship Project

Submitted to the Faculty of

Olivet Nazarene University

for partial fulfillment of the requirements for

GRADUATION WITH UNIVERSITY HONORS

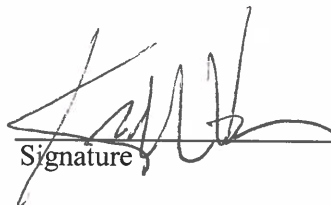
February 2022

BACHELOR OF SCIENCE

in


Psychology & Spanish

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ACKNOWLEDGEMENTS

I would like to extend my sincere gratitude to all those who stood by me throughout this project. I would specifically like to thank Dr. Kristian Veit who has been my mentor and cheerleader for over two years. I have learned an immeasurable amount under his guidance. Dr. Elizabeth Schurman and the Honors Department faculty were pivotal in the development and refining of my project. This project would not be what it is today without Dr. Schurman's guidance on writing a thesis and creating a project. I would also like to thank Dr. Russ Lovett for allowing me to use his classes to conduct research, without him, there would be no data.

Additionally, I am grateful for the encouragement and support provided by my parents throughout every step, and by my sisters, Kimberly and Emma, who were always willing to listen to my project ideas and future goals. To my roommates and friends that constantly supported me and helped me staple questionnaires for data collection, thank you! Caitlyn, Kelli, Sarah, Ashley, and Matt, you guys mean the world to me, and I am so thankful for your friendship. Finally, Cohort 12, you have become some of my most cherished friends and have shaped my college career. I cannot wait to see where you all go, and I am honored to be graduating beside you.

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ABSTRACT

Background

Mindfulness is defined as the state of giving full attention to a stimulus, internal or external, without inducing judgment or becoming reactionary about the feelings experienced, positive or negative (Davis & Hayes, 2012). Previous studies have investigated the relationship between mindfulness techniques and the reduction of anxiety (Chambers et al., 2008; Macdonald & Olsen, 2020); a smaller number of studies have considered test anxiety (Cho et al., 2016; Sparks, 2017). Prior research has used multiple mindfulness techniques to measure the impact on test anxiety, but few have isolated mindfulness trainings to compare the relative impact of each type on test anxiety. The present study utilized two different types of mindfulness trainings to analyze their impact on test anxiety in comparison with each other and a control group; it was hypothesized that mindfulness would increase, and test anxiety would decrease for students in the experimental conditions. The *Fog Rolling In* training group was hypothesized to experience greater decreases in test anxiety compared to the *Counting Breaths* and control group.

Methods

Forty-two individuals from three sections of a gen-ed class participated. Students were asked to participate in the study through the completion of the Mindful Attention Awareness Scale (MAAS) and a shortened form of the Test Anxiety Inventory (TAI—5). Both forms were given to each class before trainings began and again at the end of data collection. In the weeks between measures, a class-specific mindfulness training was presented three times.

Results

Data were analyzed using 2x3 mixed factorial ANOVA. There was a non-significant interaction ($p = .466$), non-significant main effects for mindfulness ($p = .501$) and test anxiety ($p = .611$), and non-significant main effect for time ($p = .484$). Mindfulness and test anxiety variables also failed to reach significance when using a paired-samples t-test to exclude the control group ($p = .064$; $p = .960$).

Conclusions

Neither mindfulness nor test anxiety changed after participants were exposed to a mindfulness training. In addition, no significant differences were found between two different forms of mindfulness training and a control group on mindfulness and test anxiety.

Keywords: mindfulness, test anxiety, anxiety, college students

INTRODUCTION

Discussions of mindfulness can be found in a plethora of settings: from self-help books to phone applications, a poster at the doctor's office, or a video on YouTube; mindfulness is easy to come by. The practice of being mindful has become prevalent in American society, prompting research to explore the effectiveness and the benefits of mindfulness techniques. Even so, mindfulness is not a new concept, and neither is research on this topic; many researchers have investigated the impact of mindfulness on one's mental state and have been doing so for over two decades (Brown & Ryan, 2003), leading to a rich field of research.

Mindfulness

Mindfulness focuses on acknowledging the present through techniques such as deep breathing, directed attention, and meditation. It can be defined as the state of giving full attention to an internal or external event without inducing judgment or becoming reactionary about what feelings these stimuli cause, regardless of whether the emotion is positive or negative (Davis & Hayes, 2012). Mindfulness has been used in efforts to improve workplace satisfaction (Hülshager et al., 2013), improve life satisfaction (Felsman, et al. 2017), reduce aggression (Milani, et al., 2013), reduce rumination (Long & Christian, 2015), and decrease test anxiety in students (Sparks, 2017; Cho et al., 2016). In each of the studies listed above, individuals have become more aware of their surroundings, their current emotional state, and times when they are content as opposed to times when they are not. These interventions have promoted emotional regulation in participants and deeper levels of self-understanding.

In addition to being used in various settings, mindfulness programs span varying lengths of time; some programs are under fifteen minutes (Polizzi et al., 2019) while others are structured as intensive 10-day retreats (Chambers, et al. 2008). The shorter programs are often used in classroom or work settings (Sparks, 2017; Zalaznick, 2017), whereas the longer programs are typically used in clinical settings (Chambers et al., 2008). There has been success in interventions of varying length; in fact, Dawson et. al found in their 2020 meta-analysis of 17 mindfulness studies that intervention length did not significantly predict mindfulness outcomes or effects for participants. The longest mindfulness intervention in the above study was 27.5 hours, while the shortest was 10 minutes; Some training programs were a single session, while the longest running program lasted 10 weeks. No further information was given on how long each session was in comparison to how long the program ran (Dawson et al., 2020).

In one intervention, several mindfulness techniques are often used, allowing the client to experience multiple facets of mindfulness. As a result of techniques being used together, few have been tested independently to discover the impact of specific types of mindfulness. Breathing exercises are the most common form of mindfulness (Sparks, 2017), which could be rooted in their familiar and relatively self-explanatory nature (Zalaznick, 2017). Different types of exercises work with different skill sets; some forms of mindfulness target acceptance, present-awareness, bodily awareness, or overcoming obstacles (Apsche & Jennings, 2013). These are a limited number of examples of mindfulness facets that have been explored.

In the same vein, MacDonald and Olsen published a study on the impacts of different mindfulness skills; the researchers discovered that specific mindfulness-related

skills, such as non-judgmental thinking and awareness, can lead to better attentional control which can reduce anxiety in students (2020). Mindfulness techniques can have a lasting impact beyond the completion of a training program and there were no significant differences in mindfulness based on whether the interventions were instructor-run or self-run (Dawson et. al, 2020). However, in 2021 Lothes presented conflicting data, stating that if mindfulness techniques are abandoned, the benefits of mindfulness will not endure, suggesting that continual practice is needed for long-lasting benefits. Regardless of the lasting impacts, both studies found mindfulness to be beneficial to those who practiced it (Dawson et al., 2020; Lothes, 2021).

Test Anxiety

Test anxiety impacts students of all ages. Some students are impacted as early as elementary school, while others experience anxious feelings about exams later in high school, college, or even during graduate programs (Zalaznick, 2017). The American Psychological Association (APA) conducted a study in 2014 assessing student anxiety and stress, finding that 31% of teens believed their stress levels increased during the school year, and that only 50% of teens felt confident in their ability to handle personal problems and stress. Educators have been noticing an increase in student anxiety; one in ten students believe their grades reflected a lower understanding of material than what they possess (Sparks, 2017). The gap between knowledge and performance is especially relevant when talking about student testing, which can be a source of stress and anxiety for many students.

Test anxiety is generally accepted to have two subcategories: worry and emotionality (Morris et al., 1981). These subcategories can further be broken down into state and trait characteristics; these determine whether an experience is typical of a person

because of their nature, or if the current emotion is situational, adding to the complexities of test anxiety (Morris et al., 1981). The amount of variation in experiences makes test anxiety difficult to treat; however, there has been success with mindfulness practices. Test anxiety closely resembles an emotional state, an in-the-moment affliction, rather than a disorder, which allows it to be targeted by mindfulness techniques promoting calmness and awareness (Cho et al., 2016).

Mindfulness and Test Anxiety

A major benefit of mindfulness is the ability to reduce test anxiety as shown by significant drops in student anxiety in several studies (Dawson et. al, 2020; Sparks, 2017; Cho et al., 2016). Students experience anxiety for many reasons, but test anxiety is a prominent affliction. Testing anxiety can lead to lower test grades, diminished self-efficacy, and other unpleasant feelings related to anxiety that can prohibit students from accurately portraying their knowledge of class material (Dawson et. al, 2020). Many students are impacted by feelings of anxiety, especially regarding class work, creating a need for an intervention (MacDonald & Olsen, 2020).

Since test anxiety most affects those taking tests, classroom programs and promotion of mindfulness can easily reach the target audience. Mindfulness is easy to use in the classroom because it does not need to be time consuming to be effective (Long & Christian, 2015). It is also inexpensive, which is useful for school districts with limited resources. Mindfulness can reach a large group of people in a limited amount of time while still yielding improvements in areas like one's anxiety levels and emotional distress (Dawson et al., 2020).

Mindfulness can help students in the classroom while providing lasting skills that can be applied throughout school and in future careers (Zalaznick, 2017). According to Sparks, student mindfulness grew quickly in the 2015-16 school year in a school district in Austin, TX due to a new mindfulness curriculum called “Mindful Classrooms” (2017). This 36-week curriculum was initially used in 20 classrooms, later expanding to 130 classrooms of all age ranges; this expansion took place in less than 2 years because of the success in the initial classes (Sparks, 2017). This district in Austin experienced calmer and less stressed students in every grade, from kindergarten to high school (Sparks, 2017).

Research has also been applied to college students and the reduction of test anxiety through mindfulness. In Cho et al. (2016) university students practiced mindfulness independently for six days and attend one educational session with a researcher before measuring test anxiety levels and positive thoughts. By the end of the study, those in the mindfulness condition experienced more positive thoughts and less test anxiety than those in a control or cognitive reappraisal group (Cho et al., 2016).

In a 2020 meta-analysis Dawson et al. analyzed different Mindfulness Based Interventions (MBIs) used by colleges and college students. The researchers found that MBIs have a significant impact on distress and state anxiety when compared with control groups. Similarly, Lothes et al. had college students practice mindfulness using Dialectical Behavior Therapy (DBT) techniques through an 8-week mindfulness program (2021). Students in the mindfulness condition demonstrated significant within-group improvements of general and test anxiety (Lothes et al., 2021).

The current body of research emphasizes many benefits of mindfulness, each using a different mindfulness technique to do so. After reading Apsche and Jennings’ 2013 study

which employed multiple types of mindfulness activities within one session, the principal researcher of the current study became curious about the differing impacts, if any, of different types of mindfulness practices on test anxiety. The 2013 study used a variety of mindfulness trainings, but the *Counting Breaths* training was used in the majority of sessions (Apsche & Jennings) and was chosen to be included in the present study. This technique is reminiscent of many breath trainings, which are frequently used in mindfulness programs because of the high level of accessibility.

The other training chosen in this study to measure the effectiveness of mindfulness techniques was the *Rolling In* training. This training has participants focus on a thick cloud of fog that is approaching, which is symbolic of an aversive event. For many students, tests are anxiety inducing and stressful events. By practicing overcoming an inevitable and worrying event, students can practice working through emotions similar to what they might feel before taking a big test.

Even though there are many different techniques associated with mindfulness, there is little data about what types of techniques provide the best results. There is a gap in research regarding specific data on the effectiveness of different types of mindfulness trainings. The lack of such research inspired the researcher of this study to isolate specific mindfulness activities that use different approaches to regulating emotions to test for a difference in effectiveness of the trainings. The focus on the different effects of training led to three main hypotheses:

1. Students in the experimental groups will show improvements in mindfulness throughout the semester. These differences will be greater than those displayed by the control group

2. Students in the experimental groups will show decreases in test anxiety throughout the semester. These differences will be greater than those displayed by the control group
3. Students in the *Fog Rolling In* training will display greater decreases in test anxiety than those in the *Counting Breaths* training or in the control group.

METHODS

Participants

This quasi-experimental study utilized 42 undergraduate students (21 male, 21 female) at a small, denominationally affiliated university in the Midwest. Throughout the study, 72 students filled out at least one measure, however, only 42 students filled out every measure, therefore being included as a participant. Those who did not complete all measures were excluded from the data analysis. The mean age of participants was 19.6 years. The majority of participants were white, 76.2%, while 9.5% were African American, 7.1% were Hispanic, 4.8% were Asian, and 2.4% identified as both Hispanic and White. There were 14 participants in the *Fog Rolling In* training, 15 for *Counting Breaths*, and 13 participants in the control group.

Participants were drawn from a general education course on Biblical Studies. To increase the amount of control in the study, three class sections of the same course taught by the same professor at various times throughout the day were used. Students were asked to sign an informed consent document if they wished to participate in the study. Students were incentivized to participate with the chance to win one of nine \$10 gift cards that would be awarded at the end of the study to 3 participants per class.

Materials

In order to measure mindfulness, the Mindful Attention Awareness Scale, MAAS, was used ($\alpha = .87$; $r = .81$) (Brown & Ryan, 2002). The MAAS is scored by averaging the participant's self-reported degree of mindfulness across 15 items rated on a 6-point scale with endpoints ranging from 1 (almost always) to 6 (almost never); the higher the average, the more mindful a participant is said to be.

Test Anxiety was measured using the TAI—5 ($\alpha = .88$; $r = .53$) (Taylor & Deane, 2002). This questionnaire measures how likely one is to experience symptoms of test anxiety. A 4-point scale with endpoints of 1 (Strongly Disagree) to 4 (Strongly Agree) is used. The TAI—5 is a five-question scale that includes two questions to measure worry, two measures of emotionality, and one question that asks the responder if they feel they experience anxious feelings regarding test taking. The higher participants score on the TAI—5, the more test anxiety they experience. Although the scale measures both subcategories of test anxiety, this study only considered overall test anxiety scores.

The two mindfulness trainings, *Fog Rolling In* and *Counting Breaths*, are from Apsche and Jennings's book, *The Mindfulness Toolkit: For counselors, teachers, coaches, and clinicians of youth* (2013). The first class received a training focused on overcoming aversive events, called the *Fog Rolling In* training. This training guided students through the process of mindfulness using imagery such as "The fog slowly rolls toward you. Soon the trees close to you disappear in the white mist. You observe the fog. You don't judge it. It is neither good nor bad. It just is what it is" (Apsche & Jennings, 2013). The second class used an intentional breathing exercise called *Counting Breaths*. This guided breathing exercise aimed to induce a calm and relaxed state in students, using instructions like, "Take

a long, deep breath and as you inhale, mentally count ‘one.’ Then, as you slowly exhale, count ‘two.’” (Apsche & Jennings, 2013). Both trainings were recorded in separate audio files, so they could be played on training days without variation of content. The final class was the control group and received the same explanation of mindfulness as the treatment groups at the beginning of the study; however, the control group did not receive any further information other than being asked to fill out the forms provided.

Participants were asked to fill out their demographic information including age, sex, and ethnicity. To measure age, participants wrote how old they were, while they were asked to check a box for sex (male or female) and could check as many boxes as applied to them for ethnicity. Participants were given the option “Prefer not to answer” for each question. Hughes et al.’s measure of ethnicity was used to be inclusive of many different origins and included options to select more than one ethnicity for those it applied to (2016).

Procedure

This study is a 2x3 mixed-subjects quasi-experiment. Participants did not choose their class, as the mindfulness group they were in could not be randomly assigned. The study started a week before the second class-wide exam of the semester. After learning about the study, their rights as a participant, the voluntary nature of the study, and finally signing the informed consent, participants filled out two questionnaires: the MAAS (Brown & Ryan, 2002) and the TAI—5 (Taylor & Deane, 2002) to measure initial mindfulness and test anxiety levels. Students also provided demographic information after completing the first two measures.

During the same class period as the initial introduction, the two experimental groups heard their class-specific mindfulness training. Both trainings were between four and five minutes in length. The control group did not hear a mindfulness training; instead, the researcher offered a brief explanation of mindfulness before leaving.

Approximately two weeks later, halfway between the second and third exam of the semester, the professor played the class-specific mindfulness training at the beginning of class. The experimental groups heard the same training as before while the control group started class as they would any other day. The mindfulness trainings were played for a third and final time the class period before the third course exam, which occurred roughly three weeks after the second course exam. One week after the third exam, the researcher returned to each class and asked participants to fill out the MAAS and TAI—5 for a second time. The two experimental groups had heard their mindfulness trainings a total of three times, while the control group had filled out the initial assessments and did not hear any more about the study until the posttest assessment. At the end of this, the researcher collected the questionnaires from all three classes, concluding data collection.

RESULTS

A 2x3 mixed-subjects ANOVA was used to analyze the interaction between mindfulness training and time. One ANOVA was conducted with mindfulness as the dependent variable, and a second ANOVA treated test anxiety as the dependent variable.

The first hypothesis predicted that students in the mindfulness conditions would become more mindful. This was not supported, $F(1, 39) = .50$, $p = .484$, $\eta^2_p = .013$ (Table 1). However, because the main effect of time in this ANOVA includes the control group,

a paired-samples t-test was conducted to examine the difference in mindfulness over time for the experimental groups. Still, there was no significant difference in mindfulness from before to after the mindfulness training, $t(28) = -1.93, p = .064, d = -.36$ (Table 2).

The second hypothesis predicted that students in the mindfulness conditions would have lower levels of test anxiety. This was also not supported $F(1, 39) = .00, p = .989$ (Table 3). When just considering the two experimental groups, excluding the control group, the results remained the same, $t(41) = .05, p = .96, d = .008$ (Table 4).

The third hypothesis considered the difference between mindfulness trainings, stating that those in the *Fog Rolling In* training would show less test anxiety than the other two groups. The main effect for mindfulness from the between subjects ANOVA did not reach significance ($p = .501$) (Table 1).

Table 1
Mindfulness 2x3 Mixed Subjects ANOVA

Within Subjects Effects

	Sum of Squares	df	Mean Square	F	p	η^2_p
Time	0.128	1	0.128	0.500	0.484	0.013
Time * Training	0.399	2	0.200	0.779	0.466	0.038
Residual	10.004	39	0.257			

Note. Type 3 Sums of Squares
Dependent Variable: Mindfulness

Between Subjects Effects

	Sum of Squares	df	Mean Square	F	p	η^2_p
Training	1.34	2	0.671	0.703	0.501	0.035
Residual	37.24	39	0.955			

Note. Type 3 Sums of Squares
Dependent Variable: Mindfulness

Table 2
Mindfulness Paired Samples T-Test

Paired Samples T-Test

			statistic	df	p		Effect Size
MAAS Pretest Mean	MAAS Posttest Mean	Student's t	-1.93	28.0	0.064	Cohen's d	-0.358

Table 3
Test Anxiety 2x3 Mixed Subjects ANOVA

Within Subjects Effects

	Sum of Squares	df	Mean Square	F	p
Time TA	3.42e-5	1	3.42e-5	1.78e-4	0.989
Time TA * Training	0.0334	2	0.0167	0.0867	0.917
Residual	7.5062	39	0.1925		

Note. Type 3 Sums of Squares
 Dependent Variable: Test Anxiety

Between Subjects Effects

	Sum of Squares	df	Mean Square	F	p
Training	0.668	2	0.334	0.498	0.611
Residual	26.148	39	0.670		

Note. Type 3 Sums of Squares
 Dependent Variable: Test Anxiety

Table 4
Test Anxiety Paired Samples T-Test

Paired Samples T-Test

			statistic	df	p		Effect Size
TAI Pretest Mean	TAI Posttest Mean	Student's t	-0.0509	41.0	0.960	Cohen's d	-0.00785

DISCUSSION

The present study examined three hypotheses regarding the implications of mindfulness training on mindfulness and test anxiety in college students. The first hypothesis stated that students in the mindfulness conditions would become more mindful throughout the progression of the study, as compared to individuals in the control group. Despite other studies that had significant changes in levels of mindfulness after short trainings (Long & Christian, 2015; Polizzi et al., 2019), this study failed to discover a significant difference in mindfulness levels over time. Previous studies have utilized longer trainings that were about fifteen minutes (Polizzi et al., 2019) as opposed to five, which could be a potential source of difference.

The researcher predicted that test anxiety would decrease for students who participated in a mindfulness condition. Despite the potential of mindfulness to increase attentional awareness and decrease test anxiety, none of the groups reported a change in mindfulness; rather, the means of each group remained almost entirely the same. This result is inconsistent with previous research by Jennings and Jennings and Davis and Hayes which supports that mindfulness trainings can reduce test anxiety (2013; 2012). It also conflicts with Apsche and Jennings study that originally used the mindfulness trainings evaluated in this study although the two studies differed in method (2013). The initial data collection for this study occurred near the beginning of the Spring semester while the posttest information was gathered slightly after midterms; although it is possible the difference in workload could have had an impact on anxiety levels, previous studies with similar timelines have achieved significant decreases in test anxiety in the face of mindfulness (Lothes, 2021). Jennings and Jennings' original study (2013) demonstrated a

30% decrease in overall anxiety on the Beck Anxiety Inventory (BAI) for senior high school students who attended four mindfulness training sessions over three weeks, with two mindfulness exercises per session. The current study's inconsistency with previous data suggests that both the trainings used, and the time spent on the trainings could be major covariates in the reduction of test anxiety.

The third hypothesis was specific to the trainings used, two variables which had not been isolated prior to the study at hand. The *Fog Rolling In* training introduced an aversive event that gradually passed, allowing for feelings reminiscent of those before a test. On the other hand, breath trainings are frequently used mindfulness interventions, but are generally studied for effectiveness, not in comparison with other techniques (Polizzi et al., 2019; Sparks, 2017). Due to its similarity to the conditions before a test, the *Fog Rolling In* training was hypothesized to have a greater impact on reducing test anxiety compared to the *Counting Breaths* training. No significant differences were found between the groups' levels of test anxiety from pre- to posttest, or between experimental and control groups. This section of the study analyzed techniques that had not previously been isolated to the researcher's knowledge.

The lack of significance in the results could suggest that mindfulness trainings are most useful when used together, or that the specific trainings used were not effective, as there are few studies that use the same trainings as this study (Jennings & Jennings 2013). Regardless, these speculations go beyond the scope of the research at hand.

The present study had several limitations, including the impact of Covid-19 upon the study. There was a high attrition rate, some of which can be attributed to students entering quarantine and not being in class at the time of the second data collection.

Additionally, the trainings used were shorter than previous examples. Future studies should use a different training all together or add a second training within the same category of intervention, such as a breathing technique or guided imagery, from Apsche and Jennings's workbook (2013). This study was time-limited, spanning about a month and a half with three trainings and two data collection dates. Future studies should increase the time spent on training, the frequency of trainings, or both. The present research aimed to answer an understudied question about the effectiveness of different kinds of mindfulness trainings on students; although the current study was unsuccessful in identifying differences, future researchers should continue this type of research using different trainings or an increased amount of training, potentially using mindfulness in multiple classes a day.

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