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# Stress and Its Interventions in Undergraduate College Students During COVID-19

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# STRESS AND ITS INTERVENTIONS IN UNDERGRADUATE COLLEGE STUDENTS DURING COVID-19

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By

Katie Jones

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## ABSTRACT

Though stress in postsecondary education is a highly researched topic, the emergence of the COVID-19 pandemic has created many new questions that require answers. It is important to connect total perceived stress in undergraduate students with academic, COVID-19, and distance-learning factors and examine the effectiveness of interventions on stress and anxiety during the pandemic. This research determines the efficacy of mindfulness stress interventions (cognitive-behavioral, guided meditation, and music) for individual differences in stress, self-efficacy, and anxiety and links these variables to performance. This study measures levels of different types of stress (total perceived, distance-learning, academic, and COVID-19) for undergraduate students during the COVID-19 pandemic. I examined the effectiveness of mindfulness interventions and found that cognitive-behavioral, guided meditation, and music interventions all significantly reduced stress and anxiety and increased academic self-efficacy. There were no significant differences in type of intervention.

**KEYWORDS**: stress, students, COVID-19, pandemic, distance learning, academic self-efficacy, anxiety, performance

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# INTRODUCTION

The American College Health Association (2017) reports that over 57% of college students experience higher than average stress in their lives. The impact of this stress includes lowered confidence and physical and mental health consequences. The emergence of the COVID-19 pandemic created unprecedented situations in college education, leading to a variety of new questions about student stress. There is considerable research in the area of student stress, and the findings are inconsistent. Hence, I intend to examine interventions, college student stress, and the added dimension of COVID-19.

Stress is a normal human reaction to challenges (i.e., stressors) perceived as threats. The sense of threat manifests itself in the activation of the body's autonomic nervous system (i.e., the fight or flight response); this response can have negative effects on health and wellbeing (Damush, Hays, & DiMatteo, 1997; Grace, 1997). According to Damush et al. (1997) and Grace (1997), it correlates with anxiety, depression, addiction, and high blood pressure.

Perceived stress is the "degree to which situations in one's life are perceived as stressful" (Cohen & Williamson, 1988, p. 33). College students experience a wide range of stressors, including changes in lifestyle and independence, increased workload, new and more responsibilities, and interpersonal relationships (Ross, Niebling, & Heckert, 1999). Research on college students has shown that stress levels impact health, effectiveness, and academic performance and lead to withdrawal from college (Damush et al., 1997; Grace, 1997).

# LITERATURE REVIEW

## Negative Outcomes

While some stressors may be useful, the effects of stress are usually negative. High levels of stress impact health and have many physiological, psychological, and behavioral outcomes (Damush et al., 1997; Grace, 1997). For students, this impact on health can impact performance in their academic pursuits.

Dalton and Hammen (2018) link stress with poor health behaviors, namely unhealthy eating, sedentary behavior, insufficient sleep, and substance use. This loss of sleep is both a symptom and a cause of stress. College students report sleeping 7.4 hours on a school night and 8.1 hours on a non-school night, far less than the recommendation of approximately 9.25 hours (American Psychological Association, 2014; Tarsitano, 2019). Stress directly affects people's physiological pathways, leading to impaired immune functioning and cardiovascular stress, and stress indirectly affects physical health through maladaptive health behaviors (Shankar & Park, 2016). This study links stress with several outcomes: self-efficacy, academic performance, and mental health (anxiety).

**Self-efficacy.** Research offers evidence of a complex relationship between stress and self-efficacy. Self-efficacy is "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Ye, Posada, and Liu (2018) found that students' academic stress is negatively related to their academic self-efficacy. Shilpa and Prasad (2017) provide further support that as stress increases, self-efficacy decreases. Self-efficacy can also affect perceived levels of stress, complicating the relationship. Students who have low academic self-efficacy may perceive stressors as hindering

and insurmountable, leading to negative academic outcomes (Travis, Kaszycki, Geden, & Bunde, 2020).

**Hypothesis 1.** I predict that stress and academic self-efficacy will have a moderate negative relationship in this study.

**Academic Performance.** According to research, the effects of stress extend beyond health, negatively impacting academic performance. The level of stress individuals perceive to have produces a large effect. Shankar and Park (2016) determined that greater perceived stress is related to poorer final grades and academic performance. The more stressed students are, the worse they tend to perform in school. This study measures the effect of interventions on stress by linking the level of stress to semester grade point average (GPA).

**Hypothesis 2.** I predict that stress and academic performance will be moderately negatively related in this study.

**Mental Health.** There is extensive literature examining how stress in college students affects mental health. Shankar and Park (2016) determined that the psychological effects of stress include anxiety, panic attacks, and depression. Saravanan and Wilks (2014) also determined that stress is a predictor for depression and anxiety. Tarsitano (2019) at the American Institute of Stress reports that college stress is linked to anxiety associated with being away from home for the first time, finding a new set of friends, and performance.

**Hypothesis 3.** I predict that student stress and anxiety will have a strong positive correlation in this study.

## College Student Stressors

**Academic.** There is extensive literature examining stress in college students, which is typically high. According to research by Hoyt, Cohen, Dull, Maker Castro, and Yazdani (2020), students believe educational stressors are the most pervasive in their lives. There are several reasons college life might be stressful. According to Babakova (2019), students experience academic stress in four areas: excessive demands of parents for high learning achievements, difficulties or problems with learning the lessons, auditorium activities, and lack of sufficient knowledge. Still, research by Koudela-Hamila, Smyth, Santangelo, and Ebner-Priemer (2020) and Moawad (2020) presents evidence that exam periods are the main sources of stress for students because exams require further time demands. Students have to balance stressful exam periods with other college stressors.

**Hypothesis 4.** I predict that levels of academic stress will be significantly and positively related to total perceived stress.

**COVID-19.** Beginning in late 2019, the emergence of a new virus altered life for people worldwide. The pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), hereafter "COVID-19," became an international public health emergency, and by February 4, 2021, there were over 104.68 million reported cases (Sheposh, 2021). Common symptoms include fever, dry cough, shortness of breath (difficulty breathing), and fatigue, and extreme cases have caused millions of deaths (Sheposh, 2021; World Health Organization, 2022). The severity of COVID-19 required drastic changes in education, social practices, and the economy that have had lasting effects and increased uncertainty. These effects led to unique stressors, and the disruption and changes to college students' lives were measurable. Two of the most meaningful changes relate to content delivery and social interactions.

To help reduce the spread of COVID-19, schools across the USA halted their usual educational processes by forcing schools to close and enforcing other restrictions (Akat & Karataş, 2020). Because of these closures, schools moved to distance-learning methods. Educators had to learn how to engage students in an online setting within a week or two, with little training to guide them (Khan & Iqba, 2020). Students' most common method of participating in classes became working from their laptops at home. Educators had to adapt to the challenge of emergency remote teaching challenges of transitioning to online delivery without a regular class design (Shim & Lee, 2020). As new virtual education methods emerged due to COVID-19, students faced novel challenges that may increase stress due to COVID-19-specific stressors.

Social interactions became limited and regulated due to COVID-19, creating a unique set of isolation-related challenges. Most countries enacted social distancing policies that required people to remain a minimum of six feet apart (Milani, 2021). These physical distancing measures in the USA effectively reduced the number of COVID-19 cases, and researchers found the implementation of face masks and self-isolation might also be effective (Newbold, Finnoff, Thunstrom, Ashworth, & Shogren, 2020). Thus, required face mask policies emerged to protect people during in-person social interactions. The drastic changes in social interactions, including social distancing and quarantining, led to adverse psychological conditions, such as stress, anxiety, loneliness, and hopelessness (Akat & Karataş, 2020). Students may experience these adverse psychological conditions due to COVID-19 restrictions, which may increase the severity of the psychological effects of stress.

There are several contributors to student stress investigated in this research. Sources of stress are COVID-19 concerns and distance-learning-related concerns. Stress, anxiety, and

depression were pervasive across the world during the pandemic, creating an urgent need to study intervention effectiveness (Shah, Mohammad, Qureshi, Abbas, & Aleem, 2021). Academic stressors can be some of the most severe, and COVID-19 stressors may increase the perceived stress students experience from preexisting academic stressors.

**Virus-related Stress.** Sources of stress are well-researched and extensive. However, the emergence of unfamiliar lifestyles and challenges that accompanied the COVID-19 pandemic generated new sources of stress. Research suggests the particular stressors students experienced during COVID-19 involve school as well as the virus. Fawaz, Al Nakhal, and Itani (2021) validated a questionnaire that measures stressors related to the following categories: concerns regarding learning and evaluation methods, overwhelming load, dealing with technical difficulties, confinement, coping with problems, relief of academic stress, fear of becoming infected and jeopardizing family health, and stigma of being infected. Because students faced unique challenges while attending school during the pandemic, COVID-19 led to specific stressors in their lives, increasing perceived stress and leading to its various outcomes.

**Hypothesis 5.** I predict that levels of COVID-19 stress will be significantly and positively related to total perceived stress.

**Distance-learning Stress.** As colleges had to adapt to social distancing regulations, many schools used distance-learning strategies. These methods produced a new set of stressors as students tried to navigate unfamiliar online learning. According to Shafiq, Nipa, Sultana, Rahman, and Rahman (2021), these stressors are so severe that most students report that online classes are their biggest sources of stress. In particular, several factors make online classes so stressful. Masha'al, Rababa, and Shahrour (2020) establish specific distance-learning stressors: workloads, lack of standardized distance-learning strategy, limited resources, and distracting

environment. Because many stressors accompany distance-learning, students may be more stressed due to COVID-19 and its impact on learning methods.

**Hypothesis 6.** I predict that the usual stressors of college and the unique COVID-19 stressors will all be positively correlated.

## Mindfulness

Mindfulness is "best understood as nonjudgmental, present-centered awareness" (Nagy & Baer, 2017, p. 353). There are numerous approaches to mindfulness, ranging from those that take a minute to practice (e.g., the ten-second yawn and stretch exercise) to those that take years of application (e.g., self-directed meditation approaches). Two mindfulness interventions that have produced success include cognitive-behavioral techniques and guided meditation. Coping strategies are important for students to navigate their stress experiences successfully. There are many benefits to mindfulness-related psychological experiences, such as greater resilience and wellbeing and improved coping skills (Ciapponi, 2020; Mimura & Griffiths, 2003).

**Cognitive-behavioral Interventions.** Cognitive-behavioral techniques are usually the most effective stress interventions for student populations (Mimura & Griffiths, 2003; Richardson & Rothstein, 2008; Sidle, 2008). Ciapponi (2020) studied multiple interventions and found positive outcomes for several techniques, including cognitive-behavioral therapy. The cognitive-behavioral approach comprises various stress management techniques including the mantra repetition program as presented by Bormann, Walter, Leary, and Glaser (2017) and self-leadership as presented by Maykrantz and Houghton (2020). Other successful methods are values affirmations, control exercises, and a resilience training handbook that focuses on nurture, happiness, gratitude, mindfulness, and practical techniques (Brady et al., 2016; Gamble &

Crouse, 2020). Tollefson, Kite, Matuszewicz, Dore, and Heiss (2018) found an interactive presentation of stress management techniques that focuses on knowledge and attitude about stress to be effective for students.

Many studies suggest cognitive-behavioral interventions improve perceived stress (Bormann et al., 2017; Ciapponi, 2020; Tollefson et al., 2018). Several studies measured the effectiveness of cognitive-behavioral interventions on academic performance and found that academic performance improved (Brady et al., 2016; Tollefson et al., 2018). This study measures the effectiveness of these interventions on stress during the unique situations of COVID-19.

**Guided Meditation Interventions.** Another popular type of mindfulness intervention is guided meditation. Kindel and Rafoth (2020) implemented a curriculum of mindfulness stress interventions, including videos, short stories, poems, meditation, focused breathing, relaxation, and body scanning, which they found to be effective. Bamber and Kraenzle Schneider (2016) provide evidence that guided mindfulness meditation reduces stress and anxiety in college students. Other psychological benefits of mindfulness techniques include an increased sense of meaningfulness and enhanced self-control (Anila & Dhanalakshmi, 2016; Gupta, 2020). Further, there are physical improvements associated with mindfulness. Davidson et al. (2003) determined these benefits to include improved brain and immune function. Khademian et al. (2020) proposed a web-based application for mindful stress management strategies. This intervention provides a basis for administering mindfulness stress interventions through virtual methods.

**Music.** Music therapy is a method of stress reduction that involves listening to various types of music (Jiang, Rickson, & Jiang, 2016). Dvorak and Hernandez-Ruiz (2021) implemented a music therapy technique alongside a mindfulness-based stress intervention to determine its effect on mindful attention awareness. They determined that different types of

music have different levels of improvement on mindful awareness during meditation, with one's absorption in the music as a moderator. However, Keng, Tong, Yan, Ebstein, and Lai (2021) investigated the effects of mindfulness-based stress reduction techniques compared to those of a control condition, music therapy, and found that mindfulness techniques significantly decreased variability and instability of negative affect and emotion regulation difficulties compared to the music therapy group. Because music therapy is related to mindfulness but does not decrease stress as effectively as mindfulness-based interventions according to research, this study includes a control group whose activity is to listen to a favorite song once a day.

This study measures factors contributing to student stress during college, including COVID-19 virus-related and distance-learning-related concerns. It examines the relationships among demographic variables, college stressors (including stressors associated with COVID-19 and remote learning), perceived stress, anxiety, self-efficacy, and performance. Further, it examines the effectiveness of mindfulness interventions. This research aims to link stress sources, interventions, and outcomes of stress in college students during COVID-19.

**Hypothesis 7.** I predict that the cognitive-behavioral intervention and the guided meditation intervention in this study will reduce student stress. Specifically, I hypothesize that participants of the cognitive-behavioral intervention will have the lowest overall stress of all groups, followed by participants of the guided meditation intervention, followed by participants of the music group according to post-test results. I hypothesize there will be no change in stress levels in the control group from the pretest to the post-test, but there will be a significant change in stress levels in both intervention groups. I predict that there will be no difference in stress levels among the meditation group, cognitive-behavioral group, and the control group at the time of the pretest.

**Hypothesis 8.** I predict that the most stressed group of students will have lower academic performance, higher anxiety scores, and weaker self-efficacy than students who experience less stress. Through these hypotheses, I aim to link stressors and outcomes.

# METHODS

## Participants

Participants in this study were all undergraduate students at Missouri State University. I recruited participants for this study by contacting students in an Introductory Psychology (PSY 121) class via email and the Sona Research System. See Appendix A for recruitment content. A power analysis revealed a target number of participants as 159. I had 84 participants in the first round of the study and 22 in the second round, for a total of 106 participants. Some students did not complete the study, resulting in usable data from 66 participants. There were 22 participants in each group. I collected demographic information from participants. Seventy-seven percent of participants were female, and 21% of participants were male. Eighty-nine percent of respondents were white, 5% of respondents were Asian, 3% of respondents were black, and 1% of respondents were Latinx. The average participant age was 19 ($SD$ = 2.82). Eighty percent of respondents reported they were either partially or fully vaccinated for COVID-19, and 11% reported they were not vaccinated. Respondents received class credit for their Introductory Psychology course. All respondents received compensation in the form of entries in a drawing for one of five $25 Amazon gift cards. The more times students completed their assigned interventions, the more entries they received. There were no anticipated risks to participants.

## Measures

**Perceived Stress Scale (PSS).** To measure the outcome stress, I used a modified PSS (see Appendix B). The original PSS measures the frequency of stressful thoughts and feelings over the last month. I revised the time period to two weeks. To measure how frequently stressful

feelings occurred, the scale ranges from 0 to 4, with 0 meaning "never" and 4 meaning "very often." To calculate the overall level of perceived stress, I calculated an average of all individual responses. Cronbach's alpha reliabilities for the PSS are .84, .85, and .86 in each of the three samples (Cohen, Kamarck, & Mermelstein, 1983).

**Academic Self-Efficacy Scale (SES).** To measure the outcome of academic self-efficacy, I used the SES (see Appendix C). The SES measures one's confidence in one's ability to succeed in academic-related activities. The scale first lists questions about understanding academic content and uses a 7-point scale ranging from "very much below average" to "very much above average." The second part of the scale asks about one's confidence in achieving various grade point averages and uses a 7-point scale ranging from "not confident" to "100% confident." I used average ratings for individuals to indicate levels of academic self-efficacy. Reliability coefficients are good for the SES, with the highest inter-item correlation being .84 (Wood & Locke, 1987).

**Beck Anxiety Inventory (BAI).** To measure the outcome of anxiety, I used the BAI (see Appendix D). The BAI is a self-report measure of anxiety. The questions list common symptoms of anxiety and ask individuals to rate how much each symptom has bothered them in the past month. The scale ranges from 0 to 3, with 0 meaning the symptom did not bother the participant at all and 3 meaning the symptom bothered the participant a lot. As the number of symptoms that bother the participant increase, the participant's level of measured anxiety increases. I averaged individuals' scores to measure anxiety levels. The overall reliability coefficient for the BAI is .92 (Beck, Epstein, Brown, & Steer, 1988).

**Academic Stressors Scale.** To measure academic stressors, I used a modified version of the Academic Stressors Scale (see Appendix E). The Academic Stressors Scale measures what

obstacles and stressors students experience at college. The subscales and their corresponding reliability coefficients are lack of sufficient knowledge (α = .81), learning material and the lecturers (α = .82), auditorium activities (α = .79), and parental expectations (α = .84) (Babakova, 2019). The scale measures 19 items on a 5-point scale. The modified version I used includes 18 items. I did not include the item "Time Delays" on the auditorium activities factor. I averaged scores for individuals to determine average levels of academic-related stress.

**COVID-19 Student Stress Questionnaire (CSSQ).** To measure COVID-19 stressors, I used the CSSQ (see Appendix F). The CSSQ measures how stressful it is to attend college during the COVID-19 pandemic. The CSSQ subscales are learning and evaluation methods, overwhelming load, dealing with technical difficulties, confinement, coping with problems, relief of academic stress, fear of becoming infected and jeopardizing family health, and the stigma of being infected. Questions ask about various aspects of pandemic-related isolation and virus-related concerns. The questionnaire uses a 5-point scale ranging from 0 to 4, with 0 meaning the item is not at all stressful and 4 meaning the item is extremely stressful. To determine average COVID-19-related stress, I averaged individuals' scores. The Cronbach's alpha for the CSSQ scale is .71 (Zurlo, Cattaneo Della Volta, & Vallone, 2020).

**Distance-Learning Stress Questionnaire (DLS).** Another measure for stressors in this study is the Distance-Learning Stress Questionnaire (see Appendix G). I developed this questionnaire based on the research conducted by Masha'al et al. (2020). Masha'al et al. (2020) determined that there are four basic categories of stressors involving distance-learning: workloads, lack of standardized distance-learning strategy, limited resources, and distracting environment. Using these categories, I created questions based on each of the four subscales. The questionnaire uses a 5-point scale, ranging from "strongly disagree" to "strongly agree."

Reliability reports from this study show that this questionnaire is acceptable, with an overall reliability coefficient of .71 (calculated at the pretest level). I averaged individuals' scores across the nine items.

**Demographics.** The demographics section consists of 14 questions (see Appendix H). It asks respondents to indicate race, gender, and age. There is a question about if respondents took an online class before the COVID-19 pandemic. There are six questions about if respondents' classes were online, hybrid, or used Zoom video conferencing. There are two questions about college credits: one about number of hours in which students are currently enrolled and one about number of hours completed. There is one question that asks respondents to disclose their overall GPA. Finally, there is one question asking participants to indicate their COVID-19 vaccination status. The demographics questions accompanied the post-test.

## Mindfulness Interventions

This study implemented two interventions and one related control activity to measure their effectiveness on stress, anxiety, and self-efficacy, linking all factors to performance. The interventions are based on the literature review of mindfulness and its effects. Though the interventions are both mindfulness interventions, one is meditation-based and one is cognitive-behavioral based. Students were randomly assigned to the meditation or cognitive-behavioral intervention or to the control group so that one-third of participants were placed into each group. Intervention implementation occurred after participants completed the first survey, and participants completed a post-test survey after the interventions.

**Cognitive-behavioral.** The first intervention is a cognitive-behavioral intervention in the form of a daily text message. I placed one-third of participants into a text messaging group via

the GroupMe cellphone application. Students in the group received a text message at 9:30 every morning. The text messages encouraged participants to think about how they felt each day and offered ways to change their thoughts and feelings. Then, the messages offered ways to change behavior based on new thoughts and feelings. For the full list of text messages, see Appendix I. The cognitive-behavioral text message intervention focused on allowing participants to notice when they were experiencing negative thoughts and emotions, such as stress, and guiding participants on how to change their thoughts and emotions to produce behaviors conducive to reducing stress. I asked participants to reply to the text message every day and participate in the intervention at least eighty percent of the time they received the texts. At 12:00 noon every day, students received a reminder.

**Guided Meditation.** The second intervention is a daily meditation intervention. One-third of participants were randomly assigned to the meditation intervention. I sent participants an email with instructions and a link to a 2-minute and 15-second video on YouTube.com (see Appendix J for full email and link). The email instructed participants to click the link and listen to the short guided meditation once a day, preferably when they are feeling stressed. The instructions also recommend that participants set a reminder on their cellphones to help them remember to complete the meditation because they needed to complete the exercise at least eighty percent of the time. The guided meditation video instructed listeners on how to relax their bodies and become aware of their thoughts (e'Silva, 2016).

**Music.** Participants in the active control group completed a related activity that required a similar time commitment. I sent one-third of participants an email instructing them to listen to their favorite song once a day (see Appendix K for full email). The instructions also recommend that participants set a reminder on their cellphones to help them remember to complete the task.

**Procedures**

This study received approval from the Institutional Review Board (IRB) at Missouri State University on August 30, 2021 (IRB-FY2021-468; see Appendix L). I used the online survey platform Qualtrics to administer surveys using links that participants accessed on their cellphones or computers. I used several validated questionnaires: Perceived Stress Scale (PSS), Academic Self-Efficacy Scale (SES), Beck Anxiety Inventory (BAI), Academic Stressors Scale, and the COVID-19 Student Stress Questionnaire (CSSQ). The other sections that accompanied the scales are comprised of the Distance-Learning Stress Questionnaire and demographic questions (age, gender, race, college credits, delivery method of classes, and vaccination status).

The participants received and responded to the recruitment materials by signing up on Sona. First, participants received a link to the pretest survey. Before beginning the survey, participants read and agreed to an informed consent description (see Appendix M). The first survey included the Academic Stressors Scale, the CSSQ, the PSS, the DLS, the SES, and the BAI.

Next, participants were randomly assigned to one of two intervention groups or the control group. They participated in their assigned intervention for 10 days (two weeks, Monday-Friday). After the end of the second week, participants received a link to the post-test survey via email. The second survey includes the Academic Stressors Scale, the CSSQ, the PSS, the DLS, the SES, the BAI, and demographic questions. I gathered data about academic performance, operationally defined as GPA.

I conducted the full experiment two times with different participants. Both times, the procedures were identical except for one error in the instructions during the beginning of the first round. In the first round, participants in the control group received an email containing the

correct instructions apart from one line at the end, which read, “Please reply to this email each day starting tomorrow to let me know you have completed the meditation.” I sent a clarifying email to tell participants that the line should have said, "Please reply to this email each day to let me know you have completed the activity.” The first round of the experiment occurred during the beginning of the fall semester, and the second round occurred during the middle of the fall semester. I conducted the entirety of the experiment virtually.

# RESULTS

I used IBM SPSS software to analyze combined data from both rounds of experimentation in aggregate form. I screened data for missing values and outliers and deleted 40 cases. I checked for multivariate normality, linearity, homogeneity, and homoscedasticity and did not find any issues. I found significant correlations across several measures. I found significant differences in the expected directions from the pretest to the post-test for all six scales.

## Descriptive Statistics

**Scales.** See Table 1 for descriptive statistics of scale measures based on a General Linear Model. Results from the general linear model are separated by time for each scale using the overall mean for each of the pretests and the overall mean for each of the post-tests. The average score on the PSS was the highest for the stress scales at the pretest level ($M$ = 3.13, $SD$ = 0.52), followed by the Academic Stressors Scale ($M$ = 2.67, $SD$ = 0.75), followed by the DLS ($M$ = 2.44, $SD$ = 0.53), followed by the CSSQ ($M$ = 2.33, $SD$ = 0.72).

**Course Credits and Academic Standing.** Participants provided information about the number of classes in which they were enrolled in the fall 2021 semester (the semester of data collection), their total course credits earned, and their academic performance (GPA). Eight percent of students indicated they were enrolled in 8 to 12 credit hours. Forty-six percent indicated enrollment in 13 to 14 hours. Students enrolled in 15 to 16 hours comprised the largest group, with 47% of participants. Most participants were freshmen: 70% of participants had taken 29 total college credit hours or fewer. Twenty-six percent had received 30 to 59 credits, 3% had

Table 1. Descriptive Statistics (General Linear Model).

| Measure and Time | *p* | *F* | *M* | *SE* | *d* | 95% CI |
|---|---|---|---|---|---|---|
| Perceived Stress Scale | < .001 | 47.02 | | | .84 | |
| Time 1 | | | 3.13 | .07 | | [3.00, 3.25] |
| Time 2 | | | 2.65 | .07 | | [2.51, 2.80] |
| Academic Self-Efficacy Scale | .04 | 4.67 | | | .26 | |
| Time 1 | | | 5.17 | .08 | | [5.01, 5.33] |
| Time 2 | | | 5.28 | .08 | | [5.12, 5.45] |
| Beck Anxiety Inventory | < .001 | 32.59 | | | .70 | |
| Time 1 | | | 2.13 | .08 | | [1.97, 2.30] |
| Time 2 | | | 1.83 | .08 | | [1.67, 1.98] |
| Academic Stressors Scale | < .001 | 63.00 | | | .55 | |
| Time 1 | | | 2.67 | .09 | | [2.48, 2.85] |
| Time 2 | | | 2.35 | .09 | | [2.18, 2.52] |
| COVID-19 Student Stress Questionnaire | .001 | 12.27 | | | .43 | |
| Time 1 | | | 2.33 | .09 | | [2.16, 2.51] |
| Time 2 | | | 2.07 | .09 | | [1.90, 2.25] |
| Distance-Learning Stress Questionnaire | .02 | 6.14 | | | .29 | |
| Time 1 | | | 2.44 | .07 | | [2.31, 2.60] |
| Time 2 | | | 2.30 | .06 | | [2.18, 2.41] |

received 60 to 89 credits, and 2% had received 90 or more. Overall grade point averages across the music group ($M$ = 3.78, $SD$ = 0.40), meditation group ($M$ = 3.61, $SD$ = 0.50), and cognitive-behavioral group ($M$ = 3.56, $SD$ = 0.52) are similar. See Table 2 for demographic descriptive statistics for groups. The overall average GPA across all groups is 3.65 ($SD$ = 0.47).

Table 2. Demographic Descriptive Statistics for Groups.

| | Music Group | | | Meditation Group | | | Cognitive-behavioral Group | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | *N* | *M* | *SD* | *N* | *M* | *SD* | *N* | *M* | *SD* |
| GPA | 33 | 3.78 | 0.40 | 33 | 3.61 | 0.50 | 33 | 3.56 | 0.52 |
| Age | 33 | 19.23 | 2.76 | 33 | 18.59 | 0.80 | 33 | 19.41 | 4.00 |

**Course Delivery Methods.** Participants answered several questions about the delivery methods of their college courses. According to responses, 62% of participants had not taken an online class prior to the COVID-19 class delivery changes. Forty-one percent of participants indicated at least one of their courses was completely online in the 2020-2021 school year (the academic year preceding data collection) because of COVID-19. Forty-one percent of participants also indicated at least one of their courses was hybrid (part online, part in-person) in the 2020-2021 school year because of COVID-19. Twenty-six percent of participants indicated at least one of their courses was completely online in the fall 2021 semester because of COVID-19. Seventy-three percent of participants also indicated at least one of their courses was hybrid in the fall 2021 semester because of COVID-19. Forty-nine percent of participants indicated that at

least one of their courses used a virtual meeting platform such as Zoom in the 2020-2021 school year, while 61% of participants indicated the use of such a platform in the fall 2021 semester. See Table 3 for descriptive statistics of course delivery responses for groups.

## Correlations

**Hypothesis 1.** Hypothesis 1 predicted that stress and academic self-efficacy will have a moderate negative relationship in this study. The data supports this hypothesis for academic stress and distance-learning stress. The data shows that academic stress correlates significantly and negatively with academic self-efficacy, $r(64) = -.38$, $p = .002$. Distance-learning stress also correlates significantly and negatively with academic self-efficacy, $r(64) = -.41$, $p = .001$. Self-efficacy does not correlate significantly with the PSS, though the correlation is in the expected direction, $r(64) = -.23$, $p = .06$. Self-efficacy does not correlate with the BAI, $r(64) = -.06$, $p = .64$, or the CSSQ, $r(64) = -.13$, $p = .31$.

**Hypothesis 2.** Hypothesis 2 predicted that stress and academic performance will be moderately negatively related in this study. The data does not support this hypothesis. Interestingly, the data reveals instead that academic performance is positively related to academic self-efficacy, $r(64) = .50$, $p < .001$. Other correlations for academic performance are in the expected directions, but they are not significant. Performance and the PSS revealed a nonsignificant positive correlation, $r(64) = .04$, $p = .15$, performance and the BAI revealed a nonsignificant positive correlation, $r(64) = .09$, $p = .52$, performance and academic stress revealed a nonsignificant negative correlation, $r(64) = -.21$, $p = .12$, performance and the CSSQ revealed a nonsignificant negative correlation, $r(64) = -.20$, $p = .14$, performance and the DLS revealed a nonsignificant negative correlation, $r(64) = -.22$, $p = .12$.

Table 3. Descriptive Statistics of Course Delivery Responses for Groups.

| Question | Music Group | | Meditation Group | | Cognitive-behavioral Group | |
|---|---|---|---|---|---|---|
| | Percent No | Percent Yes | Percent No | Percent Yes | Percent No | Percent Yes |
| Before the COVID-19 class delivery changes, did you ever take an online class? | 64 | 36 | 59 | 41 | 64 | 36 |
| Were any of your college classes in the 2020-2021 school year completely online because of COVID-19? | 23 | 27 | 14 | 46 | 23 | 50 |
| Were any of your college classes in the 2020-2021 school year hybrid (part in-person, part online) because of COVID-19? | 23 | 23 | 14 | 46 | 18 | 55 |
| Are any of your fall classes completely online due to COVID-19? | 46 | 32 | 46 | 41 | 50 | 37 |
| Are any of your fall classes hybrid (part in-person, part online) because of COVID-19? | 23 | 77 | 32 | 68 | 27 | 73 |
| Did any of your college classes in the 2020-2021 school year use Zoom or a similar service? | 9 | 36 | 9 | 55 | 18 | 55 |
| Do any of your fall classes use Zoom or a similar service? | 36 | 64 | 41 | 59 | 41 | 59 |

**Hypothesis 3.** Hypothesis 3 predicted that student stress and anxiety will have a strong positive correlation in this study. The data supports this hypothesis. The data shows that total perceived stress ($r(64) = .62$, $p < .001$), COVID-19 stress ($r(64) = .29$, $p = .02$), academic stress ($r(64) = .32$, $p = .01$), and distance-learning stress ($r(64) = .27$, $p = .03$) all correlate significantly and positively with anxiety.

**Hypothesis 4.** Hypothesis 4 predicted that levels of academic stress will be significantly and positively related to total perceived stress. The data supports this hypothesis. The data shows a significant positive relationship between academic stress and total perceived stress, $r(64) = .47$, $p < .001$. Distance-learning stress correlates positively but not significantly with total perceived stress, $r(64) = .18$, $p = .15$.

**Hypothesis 5.** Hypothesis 5 predicted that levels of COVID-19 stress will be significantly and positively related to total perceived stress. The data does not support this hypothesis. Though the relationship is in the expected direction, it is not significant, $r(64) = .22$, $p = .07$. Interestingly, the data reveals that COVID-19 stress is positively related to anxiety ($r(64) = .29$, $p = .02$), distance-learning stress ($r(64) = .29$, $p = .02$), and academic stress ($r(64) = .27$, $p = .03$).

**Hypothesis 6.** Hypothesis 6 predicted that the typical stressors of college and the unique COVID-19 stressors will all be positively correlated. The data supports this hypothesis. The data shows that COVID-19 stress and academic stress have a significant positive correlation, $r(64) = .27$, $p = .03$. Distance-learning stress and academic stress also have a significant positive correlation, $r(64) = .43$, $p < .001$. See Table 4 for zero-order correlation data of study measures.

Table 4. Zero-order Correlation Data of Study Measures.

| Measure[a] | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. PSS | - | | | | | | |
| 2. SES | − .23 | - | | | | | |
| 3. BAI | .62 * | − .06 | - | | | | |
| 4. AS | .47 * | − .38 * | .32 * | - | | | |
| 5. CSSQ | .22 | − .13 | .29 * | .27 * | - | | |
| 6. DLS | .18 | − .41 * | .27 * | .43 * | .29 * | - | |
| 7. GPA | .04 | .50 * | .09 | − .20 | − .20 | − .22 | - |

Note: * = $p < .05$
[a] Measure names are as follows: Perceived Stress Scale, Academic Self-Efficacy Scale, Beck Anxiety Inventory, Academic Stressors Scale, COVID-19 Student Stress Questionnaire, Distance-Learning Stress Questionnaire, grade point average

**Group and Time Comparisons**

**Hypothesis 7.** Hypothesis 7 predicted that the cognitive-behavioral intervention and the guided meditation intervention in this study would reduce student stress. Specifically, it hypothesized that participants of the cognitive-behavioral intervention will have the lowest overall stress of all groups, followed by participants of the guided meditation intervention, followed by participants of the music group according to post-test results. I analyzed between-groups analyses of variance (ANOVAs) after averaging scores for each scale for participants in each group at the pretest and post-test levels to determine that the results support the prediction that the cognitive-behavioral intervention and the guided meditation intervention reduced student stress, but there were no significant differences across groups. Tables 5, 6, 7, 8, 9, and 10 show results from the ANOVAs for each scale. I predicted that there would be no difference in stress

Table 5. Between-Groups ANOVA Statistics for Perceived Stress Scale.

| Group and Time | *p* | *F* | *M* | *SD* | 95% CI |
|---|---|---|---|---|---|
| Pretest | .69 | .42 | | | |
| Music Group | | | 3.09 | 0.55 | [2.85, 3.33] |
| Meditation Group | | | 3.09 | 0.56 | [2.84, 3.34] |
| Cognitive-behavioral Group | | | 3.21 | 0.47 | [3.01, 3.42] |
| Post-test | .50 | .70 | | | |
| Music Group | | | 2.74 | 0.53 | [2.50, 2.97] |
| Meditation Group | | | 2.54 | 0.55 | [2.30, 2.79] |
| Cognitive-behavioral Group | | | 2.66 | 0.56 | [2.41, 2.91] |

levels among the meditation group, cognitive-behavioral group, and the control group at the time of the pretest, and results supported this prediction. All groups reported reduced stress levels for all stress measures and a change in the other associated variables measured in statistically equal amounts.

Hypothesis 7 predicted there would be no change in stress levels in the control group from the pretest to the post-test, but there would be a significant change in stress levels in both intervention groups. I analyzed using the general linear model to determine that there was a significant difference for all six scales from time one to time two in the expected directions. The results support the prediction that the cognitive-behavioral and guided meditation interventions in this study would significantly reduce student stress. Unexpectedly, the music intervention also

Table 6. Between-Groups ANOVA Statistics for Academic Self-Efficacy Scale.

| Group and Time | *p* | *F* | *M* | *SD* | 95% CI |
|---|---|---|---|---|---|
| Pretest | .62 | .48 | | | |
| Music Group | | | 5.25 | 0.56 | [5.00, 5.50] |
| Meditation Group | | | 5.20 | 0.67 | [4.90, 5.50] |
| Cognitive-behavioral Group | | | 5.06 | 0.73 | [4.74, 5.39] |
| Post-test | .62 | .48 | | | |
| Music Group | | | 5.29 | 0.61 | [5.02, 5.56] |
| Meditation Group | | | 5.38 | 0.55 | [5.14, 5.62] |
| Cognitive-behavioral Group | | | 5.18 | 0.80 | [4.83, 5.54] |

significantly reduced student stress from time one to time two in a statistically equal amount. All three types of interventions significantly reduced student stress and significantly affected associated variables from the pretest to the post-test in the expected directions. I calculated effect sizes (Cohen's *d*) for pretest to post-test differences. I found the largest effect sizes for the Perceived Stress Scale ($d = .84$) and the Beck Anxiety Inventory ($d = .70$). Table 1 shows results from the general linear model.

**Hypothesis 8.** Hypothesis 8 predicted that the most stressed group of students, which will be students who score high on the PSS, Academic Stressors Scale, CSSQ, and distance-learning questionnaire, will have lower academic performance, higher anxiety scores, and weaker self-efficacy scores than students who experience less stress. I separated all participants into two groups: participants whose combined score on the PSS, Academic Stressors Scale, CSSQ, and

Table 7. Between-Groups ANOVA Statistics for Beck Anxiety Inventory.

| Group and Time | *p* | *F* | *M* | *SD* | 95% CI |
|---|---|---|---|---|---|
| Pretest | .59 | .53 | | | |
| Music Group | | | 2.01 | 0.62 | [1.74, 2.29] |
| Meditation Group | | | 2.21 | 0.78 | [1.87, 2.56] |
| Cognitive-behavioral Group | | | 2.17 | 0.61 | [1.90, 2.44] |
| Post-test | 1.00 | .004 | | | |
| Music Group | | | 1.82 | 0.65 | [1.53, 2.11] |
| Meditation Group | | | 1.83 | 0.61 | [1.56, 2.10] |
| Cognitive-behavioral Group | | | 1.84 | 0.63 | [1.56, 2.12] |

distance-learning scale were equal to or above the mean for those scales (2.49) and participants whose score on those scales were below the mean for those scales. I compared differences in the two groups' scores on the BAI, SES, and performance using *t*-tests. The results support the hypothesis that participants who scored higher on the stress scales also scored higher on the BAI ($M = 2.28$, $SD = 0.60$) than those who scored lower on the stress scales ($M = 1.68$, $SD = 0.45$), $t(64) = -4.59$, $p < .001$. The results also support the hypothesis that participants who scored higher on the stress scales scored lower on the SES ($M = 5.04$, $SD = 0.63$) than those who scored lower on the stress scales ($M = 5.42$, $SD = 0.56$), $t(64) = 2.60$, $p = .01$. Participants with above-average stress did have lower GPAs ($M = 3.59$, $SD = 0.55$) than those with below average stress ($M = 3.70$, $SD = 0.40$), but the results were not significant $t(53) = .86$, $p = .40$, $d = .23$.

Table 8. Between-Groups ANOVA Statistics for Academic Stressors Scale.

| Group and Time | *p* | *F* | *M* | *SD* | 95% CI |
|---|---|---|---|---|---|
| Pretest | .39 | .97 | | | |
| Music Group | | | 2.59 | 0.84 | [2.22, 2.96] |
| Meditation Group | | | 2.56 | 0.59 | [2.30, 2.82] |
| Cognitive-behavioral Group | | | 2.85 | 0.78 | [2.50, 3.19] |
| Post-test | .26 | 1.37 | | | |
| Music Group | | | 2.24 | 0.78 | [1.90, 2.60] |
| Meditation Group | | | 2.26 | 0.57 | [2.01, 2.51] |
| Cognitive-behavioral Group | | | 2.55 | 0.72 | [2.23, 2.87] |

Table 9. Between-Groups ANOVA Statistics for COVID-19 Student Stress Questionnaire.

| Group and Time | *p* | *F* | *M* | *SD* | 95% CI |
|---|---|---|---|---|---|
| Pretest | .16 | 1.90 | | | |
| Music Group | | | 2.15 | 0.64 | [1.86, 2.43] |
| Meditation Group | | | 2.56 | 0.69 | [2.25, 2.86] |
| Cognitive-behavioral Group | | | 2.29 | 0.78 | [1.95, 2.64] |
| Post-test | .46 | .79 | | | |
| Music Group | | | 2.06 | 0.69 | [1.76, 2.37] |
| Meditation Group | | | 2.21 | 0.83 | [1.85, 2.58] |
| Cognitive-behavioral Group | | | 1.94 | 0.63 | [1.66, 2.22] |

Table 10. Between-Groups ANOVA Statistics for Distance-Learning Stress Questionnaire.

| Group and Time | *p* | *F* | *M* | *SD* | 95% CI |
|---|---|---|---|---|---|
| Pretest | .56 | .58 | | | |
| Music Group | | | 2.34 | 0.59 | [2.08, 2.61] |
| Meditation Group | | | 2.51 | 0.41 | [2.32, 2.69] |
| Cognitive-behavioral Group | | | 2.48 | 0.58 | [2.22, 2.74] |
| Post-test | .22 | 1.56 | | | |
| Music Group | | | 2.20 | 0.45 | [2.00, 2.40] |
| Meditation Group | | | 2.26 | 0.44 | [2.06, 2.45] |
| Cognitive-behavioral Group | | | 2.43 | 0.50 | [2.21, 2.65] |

# DISCUSSION

## Key Findings

Past research heavily links mindfulness-based intervention techniques with stress reduction (Ciapponi, 2020). While the primary purpose of this study was to determine the effectiveness of mindfulness interventions on stress and its related factors, I expected to find differences across type of intervention. Consistent with previous research, the interventions were effective in reducing stress, increasing self-efficacy, and reducing anxiety (Bormann et al., 2017; Ciapponi, 2020; Tollefson et al., 2018). However, contrary to past findings, there are no significant differences across different types of interventions. The intention of the music group was to serve as an active control group in which participants would complete a relevant but less effective activity, but participants in the music group reported equally significant changes in stress and the other outcomes. This unexpected result could have occurred because music can also reduce stress, and though I expected it to be insignificant compared to other methods, its stress-reduction efficacy was strong enough to produce similar effects (Jiang et al., 2016). The results of this study indicate that consistently practicing any of the three mindfulness-based actions leads to less total perceived stress, less COVID-19-related stress, less distance-learning stress, less academic stress, less anxiety, and greater self-efficacy. A possible explanation for a lack of differences concerning the type of intervention is that students begin to feel positive, stress-reducing effects when they being to take any action intended to reduce stress because they believe they are providing care and attention to their mental wellbeing. Holman, Johnson, and O'Connor (2018) discuss how one should be cautious when interpreting meta-analyses that show larger effects for cognitive-behavioral interventions because they may include outcomes not

related to wellbeing. These results demonstrate that several types of mindfulness interventions, including cognitive-behavioral, guided meditation, and music may be effective in reducing stress and increasing wellbeing (as defined by lower anxiety and higher self-efficacy) in the midst of the unique situation of the COVID-19 pandemic.

The results related to the hypotheses concerning stressors and outcome variables suggest that students' overall perceived stress is the highest type of stress and positively relates to high levels of academic-specific stress. The unique stressors of COVID-19 distance-learning requirements appear to contribute somewhat (though not significantly) to overall perceived stress, but they contribute significantly to levels of anxiety. Higher levels of COVID-19 and distance-learning stress reveal an interesting relationship that is specific to higher levels of anxiety rather than to both anxiety and total perceived stress. Though the unique stressors of COVID-19 do not significantly relate to total perceived stress, they do significantly relate to the typical stressors of college, so students who have higher levels of COVID-19 stress and distance-learning stress also perceive academic stress to be higher. Higher levels of academic stress and distance-learning stress correlate with lower self-efficacy, so the more stress students experience due to distance-learning, the less likely they are to believe they can successfully complete their schoolwork. Stress and academic performance are not significantly related, so students who are more stressed may actually feel more pressure to perform better. Academic performance does positively relate to academic self-efficacy, so as students believe in their abilities, they perform better. Student stress and anxiety also positively correlate, so students who are more stressed also feel more anxious. These results demonstrate a link between unique stressors students experience during the COVID-19 pandemic, the typical stresses of college, and wellbeing-related outcomes.

**Suggestions and Limitations**

A follow-up study may benefit from implementing a true control group. The purpose of the music group in this study was to serve as an active control group by allowing participants to complete a related but less research-supported activity. However, listening to one's favorite song appears to have significant effects consistent with music therapy mindfulness interventions in relation to stress reduction. A true control group in which participants do not perform any mindfulness-related activity may reveal more efficacious results and may allow researchers to observe differences across groups.

Unexpected findings in this study may be related to its limitations. This study had a limited sample size that did not meet the ideal sample size suggested by a power analysis. The sample also included limited diversity as its composition was mostly white and female. Further, the grade point averages of participants who completed the study were above average. The mistake the researcher made in sending instructions with a typo that stated "meditation" rather than "activity" may have affected the perceptions of participants in the music group during the first round of their assigned activity despite the clarification of the typo. Finally, because people may not be likely to change their habits after a short-term intervention activity, it is unlikely that long-term changes with large effect sizes will occur after a two-week stress intervention. The issues and limitations present in this study may decrease with an adequate sample size from a more diverse pool of subjects (e.g., sampling from students who are not enrolled in PSY 121) and a longer intervention period (e.g., one month). Addressing limitations and suggestions for future research may provide more interpretable results.

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# APPENDICES

## Appendix A: Research Recruitment

### Research Participants Needed

We are conducting research in the MSU psychology department to measure student stress during COVID-19. You are receiving this email because you are enrolled in undergraduate classes at this time. We know that school can be especially stressful right now, and your participation will help us understand what is stressful for you and if stress interventions can help. If you participate, you will be entered to win 1 of 5 $25 Amazon gift cards. The more times you participate in your assigned activity, the more drawing entries you will receive.

**What is the research about?**

The purpose of this research is to examine the causes of stress during COVID-19 and during participation in distance-learning (online, Zoom, etc.) courses. We also want to examine if stress interventions are effective in reducing your perceived stress levels, your academic stress levels, your COVID-19 stress levels, your distance-learning stress levels, or your overall anxiety, or if they are effective in increasing your self-efficacy. We want to link these measurements to academic performance.

**What is involved?**

You will be asked to complete an online questionnaire about your experiences. The questionnaire should not take more than ten minutes. If you are assigned to an intervention group, you will also be asked to participate in one of two different stress interventions for ten days (two weeks, Monday-Friday) following the first questionnaire. If you are assigned to the control group, you will be asked to complete a short daily activity. You will need to complete your assigned

exercise at least eighty percent of the time. After ten days of completing your assigned activity, you will be asked to complete a follow-up questionnaire that should not take more than ten minutes. There are no anticipated risks, and your information will be confidential.

**Who is conducting this research?**

Researchers in the Industrial-Organizational Psychology Program at Missouri State University are conducting this study. The researchers are Dr. Carol Shoptaugh, Professor in the Department of Psychology, and Katie Jones, graduate student in the Industrial-Organizational Psychology MS program. If you are willing to participate, please click on the link below and fill out your email address. You may also reply to this email.

Contact for this research is Dr. Carol Shoptaugh, CarolShoptaugh@MissouriState.edu.

**Appendix B: Perceived Stress Scale**

The questions in this scale ask you about your feelings and thoughts during the last two weeks. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

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 two weeks, how often have you been upset because of something that happened unexpectedly?
2. In the last two weeks, how often have you felt that you were unable to control the important things in your life?
3. In the last two weeks, how often have you felt nervous and "stressed"?
4. In the last two weeks, how often have you dealt successfully with irritating life hassles?
5. In the last two weeks, how often have you felt that you were effectively coping with important changes that were occurring in your life?
6. In the last two weeks, how often have you felt confident about your ability to handle your personal problems?
7. In the last two weeks, how often have you felt that things were going your way?
8. In the last two weeks, how often have you found that you could not cope with all the things that you had to do?
9. In the last two weeks, how often have you been able to control irritations in your life?

10. In the last two weeks, how often have you felt that you were on top of things?
11. In the last two weeks, how often have you been angered because of things that happened that were outside of your control?
12. In the last two weeks, how often have you found yourself thinking about things that you have to accomplish?
13. In the last two weeks, how often have you been able to control the way you spend your time?

In the last two weeks, how often have you felt difficulties were piling up so high that you could not overcome them?

**Appendix C: Academic Self-Efficacy Scale**

Please state your confidence to perform the following activities related to academic performance. Please use the scale to answer the questions.

1= Very much below average
2= Very below average
3= Below average
4= Average
5= Above average
6= Very above average
7= Very much above average

RATE 1 TO 7

20. How well do you concentrate and stay fully focused on the materials being presented?_____
21. How well do you memorize facts and concepts covered in class? _____
22. How well are you able to focus exclusively on understanding and answering questions and avoid breaks in your concentration? _____
23. How well do you understand facts, concepts, and arguments presented in lectures, tutorials, or course materials (e.g. textbooks)? _____
24. How well are you able to explain facts, concepts, and arguments covered in the course to others in your own words? _____
25. How well are you able to discriminate between the more important and less important facts, concepts, and arguments covered in class? _____
26. How able are you to make understandable course notes which emphasize, clarify, and relate key facts, concepts, and arguments as they are presented in lectures, tutorials, or course materials? _____

27. How confident are you in your ability to achieve the following grade point averages this semester?

| | | | |
|---|---|---|---|
| 4.0: | Not confident | 1 2 3 4 5 6 7 | 100% confident |
| 3.5 or better: | Not confident | 1 2 3 4 5 6 7 | 100% confident |
| 3.0 or better: | Not confident | 1 2 3 4 5 6 7 | 100% confident |
| 2.5 or better: | Not confident | 1 2 3 4 5 6 7 | 100% confident |
| 2.0 or better: | Not confident | 1 2 3 4 5 6 7 | 100% confident |

28. How confident are you in your ability to graduate from college with the following grade point averages?

| | | | |
|---|---|---|---|
| 4.0: | Not confident | 1 2 3 4 5 6 7 | 100% confident |
| 3.5 or better: | Not confident | 1 2 3 4 5 6 7 | 100% confident |
| 3.0 or better: | Not confident | 1 2 3 4 5 6 7 | 100% confident |
| 2.5 or better: | Not confident | 1 2 3 4 5 6 7 | 100% confident |
| 2.0 or better: | Not confident | 1 2 3 4 5 6 7 | 100% confident |

**Appendix D: Beck Anxiety Inventory**

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by that symptom during the past month, including today, marking the corresponding bubble in the column next to each symptom.

**Not at all (0) Mildly, but it didn't bother me much (1)**

**Moderately - it wasn't pleasant at times (2) Severely - it bothered me a lot (3)**

| | | | | |
|---|---|---|---|---|
| Numbness or tingling | 0 | 1 | 2 | 3 |
| Feeling hot | 0 | 1 | 2 | 3 |
| Wobbliness in legs | 0 | 1 | 2 | 3 |
| Unable to relax | 0 | 1 | 2 | 3 |
| Fear of worst happening | 0 | 1 | 2 | 3 |
| Dizzy or lightheaded | 0 | 1 | 2 | 3 |
| Heart pounding / racing | 0 | 1 | 2 | 3 |
| Unsteady | 0 | 1 | 2 | 3 |
| Terrified or afraid | 0 | 1 | 2 | 3 |
| Nervous | 0 | 1 | 2 | 3 |
| Feeling of choking | 0 | 1 | 2 | 3 |
| Hands trembling | 0 | 1 | 2 | 3 |
| Shaky / unsteady | 0 | 1 | 2 | 3 |
| Fear of losing control | 0 | 1 | 2 | 3 |
| Fear of dying | 0 | 1 | 2 | 3 |
| Scared | 0 | 1 | 2 | 3 |

| | | | | |
|---|---|---|---|---|
| Difficulty in breathing | 0 | 1 | 2 | 3 |
| Indigestion | 0 | 1 | 2 | 3 |
| Faint / lightheaded | 0 | 1 | 2 | 3 |
| Face flushed | 0 | 1 | 2 | 3 |
| Hot / cold sweats | 0 | 1 | 2 | 3 |

**Appendix E: Academic Stressors Scale**

Please rate how stressful each obstacle has been for you in the last 2 months on a scale of 1 to 5, with 1 meaning "Not stressful or not an obstacle" and 5 meaning "Extremely stressful."

| | |
|---|---|
| Disapproval of my learning results by my parents | 1 2 3 4 5 |
| Conflicts with parents because of my academic results | 1 2 3 4 5 |
| The attitude of my parents that I do not do well with my training | 1 2 3 4 5 |
| Spend a lot of time searching for information about a topic | 1 2 3 4 5 |
| Anxiety related to university exams | 1 2 3 4 5 |
| Lack of knowledge to prepare for exercises and seminars | 1 2 3 4 5 |
| A feeling of inferiority in the audience | 1 2 3 4 5 |
| Incomplete and confusing learning materials | 1 2 3 4 5 |
| Lack of sufficient information about the conduction of exams | 1 2 3 4 5 |
| The tasks assigned by the lecturer can not be completed in time | 1 2 3 4 5 |
| Lack of communication between lecturers and students | 1 2 3 4 5 |
| The abusive attitude of some lecturers towards students | 1 2 3 4 5 |
| The lack of interest in the study material by colleagues | 1 2 3 4 5 |
| The lack of consistency between professor lectures and curriculum content in textbooks | 1 2 3 4 5 |
| Lack of knowledge in a given discipline | 1 2 3 4 5 |
| Lecturers quickly write on the board / change slides of the presentation | 1 2 3 4 5 |
| Lack of discussion during classes | 1 2 3 4 5 |
| Inability to concentrate at lectures | 1 2 3 4 5 |

**Appendix F: COVID-19 Student Stress Questionnaire**

Please carefully read each item in the list below and indicate how stressful you perceive each item to be.

| Not at all Stressful | Somewhat Stressful | Moderately Stressful | Very Stressful | Extremely Stressful |
|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 |

1. How do you perceive the risk of contagion during this period of COVID-19 pandemic?
2. How do you perceive the condition of social isolation imposed during this period of COVID-19 pandemic?
3. How do you perceive the relationships with your relatives during this period of COVID-19 pandemic?
4. How do you perceive the relationships with your university colleagues during this period of COVID-19 pandemic?
5. How do you perceive the relationships with your university professors during this period of COVID-19 pandemic?
6. How do you perceive your academic studying experience during this period of COVID-19 pandemic?
7. How do you perceive the changes in your sexual life due to the social isolation during this period of COVID-19 pandemic?

**Appendix G: Distance-Learning Stress Questionnaire**

Think about your experiences participating in online classes, blended (combination online and seated) classes, and Zoom classes. These types of courses are called distance-learning classes in this questionnaire. Please rate how strongly you agree with each statement.

1=Strongly disagree, 2=Disagree, 3=Neither agree nor disagree, 4=Agree, 5=Strongly Agree

I have more work to do in distance-learning classes than traditional classes.

The coursework in distance-learning classes is more difficult than traditional classes.

It is harder for me to get good grades in distance-learning classes than traditional classes.

There are standard expectations for me to follow in distance-learning classes.

I am confused with the different strategies distance-learning classes use.

I have easy access to a reliable internet connection.

I have a personal laptop or computer.

I have a quiet place to complete distance-learning classwork.

I have a place to participate in distance-learning classes uninterrupted.

**Appendix H: Demographic Questions**

Please respond to the following demographic questions.

1. Before the COVID-19 class delivery changes, did you ever take an online class?

   Yes

   No

2. Were any of your college classes in the 2020-2021 school year completely online because of COVID-19?

   Yes

   No

   Not applicable

3. Were any of your college classes in the 2020-2021 school year hybrid (part in-person, part online) because of COVID-19?

   Yes

   No

   Not applicable

   No

   Not applicable

4. Did any of your college classes in the 2020-2021 school year use Zoom or a similar service?

   Yes

   No

   Not applicable

5. Are any of your fall classes completely online because of COVID-19?

   Yes

No

6. Are any of your fall classes hybrid (part in-person, part online) because of COVID-19?

   Yes

   No

7. Do any of your fall classes use Zoom or a similar service?

   Yes

   No

8. How many college credit hours are you currently taking?

9. How many total college credit hours have you completed (not including the hours you are taking this semester)?

   29 or below

   30 to 59

   60 to 89

   90 or more

10. What is your gender identity?

    Female

    Male

    Non-binary / third gender

    Prefer not to say

11. Choose one or more races that you consider yourself to be:

    White

    Asian

    Black or African American

Native Hawaiian or Pacific Islander

American Indian or Alaska Native

Other

12. What is your age?

13. What is your current overall GPA?

14. Have you been vaccinated for COVID-19?

Yes, fully

Yes, partially

No

Prefer not to say

**Appendix I: Comprehensive List of Text Messages**

Day 1: “Good morning! Thanks for choosing to participate in this study. You will receive a text and complete the short suggested exercises Monday-Friday for 2 weeks. Please take a few seconds to assess how you’re feeling. Are you stressed? Are you happy? Are you worried? What thoughts contribute to how you’re feeling? Ask yourself if there are any negative thoughts you can look at differently. If you’re feeling sad that you didn’t do great on an assignment, for example, try looking at the situation from a different perspective. You might think about how you’ll know what to work on for the next assignment. Today, when a negative thought/emotion comes up, consider why it’s there and how you can reframe it to be more positive! Reply to me in a direct message to give me an example of how you exercised this concept today.”

Day 2: “Hello! I appreciate your participation yesterday! How are you doing today? Think about some behaviors you might be avoiding because of stress, anxiety, or other negative feelings. For example, are you avoiding studying for a test? You might try to reframe those feelings to help yourself start studying. You can focus on how it feels to be knowledgable rather than how it feels boring to study. Remember that you can be successful! Think about a boring task differently today and try to work on the task. Reply to me in a direct message to give me an example of how you exercised this concept today.”

Day 3: “Good morning! The middle of the week can be hard. Take a moment to feel proud of yourself for your effort this week. Think about what you have accomplished. Think about a problem you might have today. Then, focus on what you can control in the situation. If you have trouble understanding a lecture, for example, you can control whether or not you look up additional resources and ask your instructor for help. It’s so important not to give up! There’s usually something you can control, even if it’s just your feelings about the situation!”

Day 4: “Hi! You are all so capable, and I hope you are taking the time to appreciate yourselves. Think about what is causing you the most stress right now. Is it school? Work? Relationships? If you can figure out why you are feeling stressed, you can reduce the impact of the stress. Today, try to address the things that are causing you stress. Face your fears, and I am confident you’ll succeed! When you expose yourself to the scary situation, you might be able to reduce negative feelings. Reply to me in a direct message to give me an example of how you exercised this concept today.”

Day 5: “Today, you might feel like relaxing. Notice your thoughts and feelings when you relax. Do you feel anxious because you have homework? Try to reframe those thoughts by reminding yourself it’s healthy to take breaks, and your anxious feelings are a reminder that what you do is important. Today, try to listen to what your thoughts are telling you about your needs. Reply to me in a direct message to give me an example of how you exercised this concept today.”

Day 6: “Wow! You all have made it so far. Take a moment to process your thoughts about the past week. Now, think about what tasks you’ll accomplish in the coming days. How do they make you feel? Really think about why they make you feel that way. Are you feeling overwhelmed? To not feel so overwhelmed, it can help to break down tasks into smaller goals. Do you have several textbook chapters to read, for example? You can break the readings into smaller chunks and set goals for each day (like 10 pages a day). Then, when you ready 10 pages, you can focus on feeling accomplished! Try to reduce your negative thoughts today by making your tasks more manageable. Reply to me in a direct message to give me an example of how you exercised this concept today.”

Day 7: “Recall yesterday’s exercise. Today, try to think about how breaking down your tasks affected your thoughts, emotions, and behaviors. Were you able to think about your tasks in a

less overwhelming way? Process how you feel at this point about tasks you still need to do. If you are avoiding them, try to determine why. Do you feel incapable? Do you feel bored? Noticing those thoughts can help you combat them. Reply to me in a direct message to give me an example of how you exercised this concept today."

Day 8: "You made it halfway through the school week! What an accomplishment. Think of three things you have done successfully this week. How do those successes make you feel? What is your body's physical response to those feelings? Describe your feelings to yourself in as much detail as possible. Reply to me in a direct message to give me an example of how you exercised this concept today."

Day 9: "As we approach the final day, reflect upon how taking the time to read these messages and implement their suggestions has affected your stress. Is it hard to slow down and become mindful of your feelings and behaviors? Is it difficult to challenge yourself to have more positive emotions? Has an awareness of your thoughts increased your feelings of control? Today, be mindful of your decision to use mindfulness exercises. Reply to me in a direct message to give me an example of how you exercised this concept today."

Day 10: "Thank you all so much for participating! Your contributions are so important. Try to combine the techniques we've talked about this week. So, start by understanding how you feel. Then, think about why you feel that way. Last, try to find how those feelings can benefit you. You have the ability to be successful even when things are hard! Reply to me in a direct message to give me an example of how you exercised this concept today."

**Appendix J: Video Link and Instructions for Meditation**

Thank you for choosing to participate in this study! The purpose of this guided meditation intervention is to determine its effects on stress, anxiety, self-efficacy, and performance. Please click on the YouTube link below and listen to the two-minute meditation once a day for the next ten weekdays (two weeks, Monday-Friday), preferably when you notice yourself feeling stressed. It might be helpful to set a daily reminder on your cellphone to help you remember to do the meditation— it only takes a short time. The guided meditation will instruct you on how to become mindful of your body and thoughts. Please reply to this email each day to let me know you have completed the meditation.

Meditation Video Link: https://www.youtube.com/watch?v=vLhOGEnEedk

**Appendix K: Instructions for Music Group**

Thank you for choosing to participate in this study! Please listen to your favorite song once a day for the next ten weekdays (two weeks, Monday-Friday). It might be helpful to set a daily reminder on your cellphone to help you remember to listen to the song. Please reply to this email each day to let me know you have completed the task.

# Appendix L: Human Subjects IRB Approval

**do-not-reply@cayuse.com** Inbox - college August 31, 2021 at 09:33

IRB-FY2021-468 - Initial: Initial Approval

To: katie111@live.missouristate.edu, michellevisio@missouristate.edu

Missouri State University

**To:**
Michelle Visio
Psychology

**RE:** Notice of IRB Approval
**Submission Type:** Initial
**Study #:** IRB-FY2021-468
**Study Title:** Stress in Undergraduate College Students During COVID-19 and Its Interventions
**Decision:** Approved

**Approval Date:** August 30, 2021

This submission has been approved by the Missouri State University Institutional Review Board (IRB). You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented. Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB.

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This study was reviewed in accordance with federal regulations governing human subjects research, including those found at 45 CFR 46 (Common Rule), 45 CFR 164 (HIPAA), 21 CFR 50 & 56 (FDA), and 40 CFR 26 (EPA), where applicable.

Researchers Associated with this Project:
**PI:** Michelle Visio
**Co-PI:**
**Primary Contact:** Katie Jones
**Other Investigators:** Carol Shoptaugh

## Appendix M: Informed Consent

### Introduction

As a student registered in undergraduate classes during the COVID-19 pandemic, we would like you to complete a pretest questionnaire about the stress you experience during college, COVID-19, and distance-learning classes as well as your perceived level of stress. The pretest will also measure your anxiety and academic self-efficacy. The post-test questionnaire will reassess your college, COVID-19, distance-learning, and perceived stress, and it will reassess your self-efficacy and anxiety. Before you agree to participate in this study, it is important that you read and understand the study and the procedures it involves. This study is being conducted by Katie Jones under the supervision of Dr. Michelle Visio and Dr. Carol Shoptaugh. Dr. Visio is a faculty member in the Industrial-Organizational Psychology Master of Science Program.

### Purpose

The purpose of this research is to examine the causes of stress during college, including COVID-19 stress and stress from participating in distance-learning (online, Zoom, etc.) courses. We also want to examine if stress interventions are effective in reducing your perceived stress levels, your academic stress levels, your COVID-19 stress levels, your distance-learning stress levels, or your overall anxiety, or if they are effective in increasing your self-efficacy. We want to link these measurements to academic performance.

### Procedures

The first survey will take approximately ten minutes to complete and will examine the types of stressors you experience (college, COVID-19, and distance-learning) and your overall stress level, and it will measure your self-efficacy and anxiety. After completing the first survey, you will either be asked to participate in a stress intervention or a control group activity. There are

two intervention options: reception of/reply to a daily text message and completion of a daily two-minute meditation. The text messages will ask you to implement a cognitive-behavioral strategy each day. The meditation will involve listening to a short YouTube video to guide your mindfulness each day. If you are assigned to the control group, you will be asked to listen to your favorite song once a day. You will need to complete your assigned exercise at least eighty percent of the time. After participating in your assigned activity for ten days, you will be asked to complete a follow-up survey that should take about ten minutes. The follow-up survey will reexamine your stress levels (perceived, college, COVID-19, and distance-learning) and your self-efficacy and anxiety levels.

**Risk and Protections**

We will examine all responses in aggregate form. We will collect only basic demographic data. All identifiable data is confidential and will be deleted.

**Benefits**

Participation in this study may lead to personal benefits in increased mindfulness, a reduction in stress, a reduction in anxiety levels, and increased self-efficacy. Additionally, exposure to the survey items might help you figure out which aspects of college are most stressful for you. The information from this study will provide a better understanding of the stressors college students face and which interventions work best to reduce stress and its impacts. You may also receive research participation credit for your Introductory Psychology course. As a result of the data we gain from your participation, other students may benefit from future stress interventions.

**Consent to Participate**

If you have any questions about the study or your role in it, be sure to contact Dr. Carol Shoptaugh at 417-836-5788 or Dr. Michelle Visio 417-836-8438. If you experience any

discomfort during the study, please reply to your daily message to let researchers know.

If you have questions about your rights as a research participant you may contact the MSU IRB @ 417-836-8362 OR 417-836-8991 and reference this study: IRB-FY2021-468.

**By clicking the arrow to enter questionnaire, you are agreeing that you have read and understand the information above and are agreeing to participate in this study. You are encouraged to ask questions. Your participation is completely voluntary and you may withdraw at any time.**