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Mobile Mindfulness: Effectiveness of Brief Practices on Depression, Anxiety, and Stress

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Abstract

Research indicates that practicing mindfulness over an extended period of time (e.g., 20-45 minutes a day) may positively impact an individual's overall well-being; however, limited empirical attention has tested the effectiveness of brief mindfulness practices. The current study examined how brief mindfulness practices influence symptoms of depression, anxiety, and stress among college students, a population who might benefit from mindfulness-based practices. This work also tested the effectiveness of practicing mindfulness using a mobile-phone application, technology relevant to college students who use their mobile-phone for a variety of endeavors on a daily basis. Participants came to an initial lab session where they

completed a self-report questionnaire and practiced one mindfulness-based strategy (i.e., mindful breathing or body scan using a mobile-phone application) or engaged in a no-strategy (control) condition. Participants in the mindfulness conditions practiced the assigned strategy using their phone and on their own for three days. Participants returned to the lab and once again practiced the assigned mindfulness strategy and answered the self-report questionnaire. Main analyses indicate little to no differences between the mindfulness conditions and control condition in relation to the variables of interest assessed over a one-week period. Implications of the findings for college students including limitations and future research directions are discussed.

Keywords: mindfulness, college students, stress

Mobile Mindfulness: Effectiveness of Brief Practices on Depression, Anxiety, and Stress

In recent years, levels of reported stress among undergraduate college students have increased in the United States (Beiter et al., 2015), and as a result, researchers have linked levels of physical and emotional well-being to the amount of stress experienced. Not only has stress increased in the United States, but the internalization of symptoms has also been on the rise, particularly for emerging adult populations (Duprey, McKee, O'Neal, & Algoe, 2018). Current research suggests that there is an increase in the demand for counseling services on university and college campuses (Xiao et al., 2017). This increase has caused some counseling centers to report feeling unprepared to adequately serve students' needs (Prince, 2015). Research on ways to help students manage stress should be a priority. Mindfulness meditation is a strategy that has been shown to help individuals manage stress and enhance well-being (Kabat-Zinn, 2003). Mindfulness has recently increased in popularity and includes strategies (e.g., mindful breathing and body scan; Mani, Kavanagh, Hides, & Stoyanov, 2015) that may be used to enhance well-being (Chambers, Lo, & Allen, 2008; Johnson, Gur, David, & Currier, 2015; Mrazek, Franklin, Phillips, Baird, & Schooler, 2013). Mindfulness is the act of being aware, paying attention to the present moment, including the internal (e.g., thoughts, emotions, bodily sensations) and external (e.g., sounds, sights, environmental aspects) experiences of each moment, without judgement (Kabat-Zinn, 2003).

Despite information gained from previous studies, there are two important limitations of prior research with regard to mindful-practices, accessibility and length of training. A majority of

previous research on mindfulness has primarily focused on engaging in the practice with a trained guide and/or researcher with expertise on the topic (Chambers et al., 2008; Johnson et al., 2015; Mrazek et al., 2013). This prior research includes having participants meet once or more per week for multiple sessions with a trained instructor. These in-person practices over an extended period of time may make the practice inaccessible to the general population, namely young adults. In addition, previous research has focused on longer sessions of approximately 45-120 minutes per session over a six to eight-week period (Chambers et al., 2008; Mrazek et al., 2013). This research indicates that the more time spent engaging in mindfulness-based practices, the more benefits; however, research has minimally focused on the immediate benefits of practicing mindfulness strategies for a short period of time, which might be more realistic for the general population, especially college-age students.

It is important to note that college students compose a unique subset of the population to focus on when examining the effectiveness of mindfulness-based strategies. Students are under similar stress conditions, whether these include interpersonal, intrapersonal, academic, and/or environmental stressors (see Johnson & Kalkbrenner, 2017). Ames and colleagues (2011) describe the process of moving to college as a significant transition for young adults as they adapt to new living arrangements. College students have expectations set for their academic performance, including performing well in the classroom, and for developing new relationships. Students are expected to meet these academic demands while adjusting to a novel and possibly stressful environment — an environment that prior research has shown might not always be suitable in terms of meeting high academic demands (Zawadzki, Graham, & Gerin, 2013). Below we outline prior mindfulness research that has focused on addressing these two limitations.

Decreasing Depression, Anxiety, and Stress

Research shows that brief practices of mindfulness for 20 to 25 minutes a day may lower anxiety (Zeidan et al., 2010) and distress (Johnson et al., 2015). In a study examining the impact of brief training sessions, Cavanagh and colleagues' (2013) results showed a statistically significant decrease in perceived stress for the mindfulness training group, whereas perceived stress remained the same for the control group. Similarly, participants in the mindfulness training group reported significant decreases in symptoms of depression and anxiety (Cavanagh et al., 2013). Krushe, Cyhlarova, and Williams (2013) examined the impact of 10 online

interactive mindfulness sessions, including formal meditation skills and informal techniques, completed over the course of four to twelve weeks. Results showed significant changes in participants' self-reported anxiety and depression symptoms, as well as decreases in perceived stress at course completion. Improvements in anxiety, depression, and perceived stress were maintained at the one-month follow-up and similar to results found for in-person training. Overall, the findings of these studies indicate there may be immediate benefits to practicing mindfulness and mastery over time may enhance the long-term benefits of the practice; however, these studies also suggest that continued research on brief training sessions is warranted to better understand these effects.

Summary of the Current Study

The current study examined how the practice of mindfulness relates to self-reported symptoms of depression, anxiety, and stress. Because college students might benefit from mindfulness practices, the current study examined the effectiveness of a mobile-phone mindfulness application for this population. Participants came to the lab at the beginning of the week (Monday) for an initial lab session, practiced the strategy on their own guided by the mobile-phone application during the week (Tuesday through Thursday), and came back to the lab at the end of the week (Friday) for a final lab session. The following hypothesis was developed: Participants in the mindful breathing or body scan conditions compared to the control condition will show decreases in depression, anxiety, and stress.

Method

Participants

Participants were recruited from general education classes at a public university in the Midwest. Seventy-four participants (25 males and 49 females, presented as biological sex) with an age range of 18-40 ($M_{age} = 19.14$, $SD_{age} = 2.61$) completed all parts of the study. The majority of the participants self-identified as White/Caucasian (79.7%), and were classified as freshman (70.3%). Participation was one of multiple ways to earn research or extra credit in their class. There were 27 participants in each experimental condition (i.e., Mindful Breathing, Body Scan) and 20 participants in the control condition. The method and procedure of the current study was approved by the Institutional Review Board.

Materials

Smiling Mind mobile phone application. Both mindfulness-based conditions utilized the phone application, “*Smiling Mind*,” an application that educates individuals on mindfulness and guides individuals through mindfulness strategies. *Smiling Mind* is free and more accessible to the general population than other mindfulness apps and includes more brief mindfulness strategies (Mani et al., 2015). Participants completed either a short breathing exercise, or a short body scan exercise. The “Exploring the Breath” session guided participants through approximately one-and-a-half minutes of focused breathing and attention to the breath. The “One Minute Body Scan” guided participants through approximately one-and-a-half minutes of attention to areas of the body, scanning for stress/tension.

Depression Anxiety and Stress Scale – 21 (DASS-21). Participants completed the DASS-21 (Lovibond & Lovibond, 1995) to measure current symptoms of depression, anxiety, and stress. Items were measured on a 4-point Likert-type scale (0 = Never, 1 = Sometimes, 2 = Often, 3 = Almost Always). A sum score for each subscale may be calculated but an average score may also be utilized for reporting participant responses (Beiter et al., 2015). An average was calculated for each variable. A mean score was created for each subscale by averaging the corresponding items scores. Higher scores indicate greater levels of depression, anxiety, and/or stress. For each subscale, items on the DASS-21 contained good internal consistency: Depression ($\alpha_{Time1} = .86$; $\alpha_{Time2} = .88$); Anxiety ($\alpha_{Time1} = .67$; $\alpha_{Time2} = .66$); Stress ($\alpha_{Time1} = .69$; $\alpha_{Time2} = .79$).

Procedure

Following the methodology of previous research assessing brief mindfulness practices (Jeter & Brannon, 2017), participation in this study occurred over one week. Participants completed the initial lab session on a Monday, practiced the strategy during the week on their own, and completed the final lab session on Friday. Participants were randomly assigned to either the mindful breathing condition, the body scan condition, or a control condition. All participants within one time slot were assigned to the same condition, and time slots were set up for groups of one to four participants.

During the initial lab session, participants completed the DASS-21, were taught how to use “Smiling Mind,” and then completed the assigned strategy together as a group. Participants

in the control condition completed the DASS-21 but were not taught a strategy. The control condition was designed to be consistent with prior research testing the effectiveness of mindfulness-based strategies (Jeter & Brannon, 2017). After practicing the strategy as a group, participants in either mindfulness condition were instructed that over the next three days they would receive an email reminding them to practice. Participants returned to the lab on Friday for the final lab session. There, they showed the researcher their dashboard screen (tracks mindfulness strategy practice) as proof of completing the strategy during the three days, practiced the assigned technique one final time, and completed the DASS-21. Participants in either mindfulness condition also responded to questions regarding their experiences.

Results

Main Analyses

It was hypothesized that participants in the mindful breathing or body scan conditions would report lower levels of depression, anxiety, and stress from Time 1 to Time 2 compared to the control group. To test the hypothesis, a mixed-factors ANOVA was performed for making multiple group comparisons for a between-subjects design. Tukey post-hoc tests were used for all analyses as it is a moderately conservative post-hoc adjustment.¹ Only participants who completed the initial session, the three days of practice, and the final lab session were included in the analyses and no participants dropped out from the study. Importantly, participants reported lower initial levels of depression ($M = 1.64$), anxiety ($M = 1.86$) and stress ($M = 2.05$) than what was expected for college-age students (Beiter et al., 2015; Cavanagh, 2013; Osman et al., 2012).

Depression. There was neither a significant main effect of time [$F(1, 68) = 0.46, p = .50$] nor significant main effect of condition [$F(2, 68) = 0.25, p = .78$]. The interaction between time and condition also was non-significant [$F(2, 68) = 0.51, p = .61$]. Participants in the mindful breathing condition did not differ significantly in their depression rating from Time 1 to Time 2 compared to participants in the body scan condition and control condition. The body scan and control condition also did not significantly differ. See Table 1.

¹ For each main analysis, time and condition were used to assess differences for each dependent variable. Given that some participants had prior experience practicing mindfulness, analyses were performed using prior experience, time, and condition to test for differences regarding the variables of interest. Results when including prior experience were the same as the main analyses.

Anxiety. Similarly, the main effect of time [$F(1, 68) = 0.23, p = .64$] and condition [$F(2, 68) = 0.29, p = .75$] were non-significant. An interaction between time and condition was not found [$F(2, 68) = 1.15, p = .32$]. Scores reported for anxiety did not differ significantly for the mindful breathing condition from Time 1 to Time 2 compared to the body scan and control group. The body scan and control condition also did not significantly differ. See Table 1.

Stress. Finally, results were similar for levels of stress. The main effect of time [$F(1, 68) = 0.68, p = .41$], the main effect of condition [$F(2, 68) = 0.04, p = .96$], and the interaction of time and condition [$F(2, 68) = 0.01, p = .99$] were non-significant. Self-reported stress scores for participants in the mindful breathing group did not differ significantly from Time 1 to Time 2 compared to the body scan condition and control condition. The body scan and control condition also did not significantly differ. See Table 1.

Table 1: Mean Scores and Standard Deviations for Depression, Anxiety, and Stress by Time and Condition

Condition	Initial Depression	Final Depression	Initial Anxiety	Final Anxiety	Initial Stress	Final Stress	Total Depression	Total Anxiety	Total Stress
Mindful Breathing	1.68 (.58)	1.66 (.62)	1.88 (.53)	1.79 (.45)	2.05 (.43)	2.02 (.42)	1.67 (.56)	1.84 (.45)	2.03 (.40)
Body Scan	1.61 (.49)	1.54 (.42)	1.82 (.39)	1.78 (.38)	2.04 (.26)	2.02 (.36)	1.58 (.42)	1.81 (.33)	2.03 (.27)
Control	1.64 (.40)	1.65 (.46)	1.87 (.55)	1.94 (.58)	2.08 (.52)	2.05 (.58)	1.64 (.46)	1.91 (.49)	2.06 (.49)
Total (SD)	1.64 (.50)	1.62 (.51)	1.86 (.48)	1.83 (.47)	2.05 (.40)	2.02 (.44)			

Discussion

The purpose of the current study was to examine how engaging in brief mindfulness practices guided by a mobile-phone application impact individuals' self-reported symptom of depression, anxiety, and stress. While previous research focuses on extended practices, the current study utilized a shorter duration to investigate immediate benefits. It was anticipated that participants in either mindfulness condition would report decreases in depression, anxiety, and stress

compared to participants in the control condition. The hypothesis was not supported as results did not suggest a significant interaction effect of time and condition on the dependent variables.

Previous research that has used the DASS-21 to assess depression, anxiety, and stress among college-age students has found that although college students do not generally report clinical-levels of depression, anxiety, and stress, they do report moderate to high levels (Beiter et al., 2015). On a 4-point Likert-type scale (rated as 0 to 3), college students generally report at or above the mid-point of the scale, especially when responding to the stress and anxiety items. As such, it was expected that participants would report similarly. However, when assessing the scores for the current sample during the initial and final lab sessions (and by condition), it was found that participants were on average reporting low-levels of depression (MTime1 = 1.64; MTime2 = 1.62), low levels of anxiety (MTime1 = 1.86; MTime2 = 1.83), and low/moderate levels of stress (MTime1 = 2.05; MTime1 = 2.02). Although high or clinical levels were not anticipated, it was surprising that students did not report higher scores. Given these low scores reported initially, it may not matter if participants practiced a mindfulness strategy as they were already reporting not being depressed, anxious, or stressed. Importantly, participants did report that the week they completed the study was an average/typical week that was not highly stressful. In the future it might be advantageous to test the strategies at a time when students would be prone to higher levels of stress and anxiety, for example, during finals week.

Given the low ratings, this might provide some preliminary support that the practice of being mindful is related to decreased depression, anxiety, and stress. This relationship is supported by previous research (Krushe et al., 2013) and suggests that continued research may be warranted. In addition to the self-report measure, participants who were randomly assigned to either the mindful breathing or body scan conditions reported that they liked using the assigned strategy and found the strategy to be helpful in relation to managing stress. This result preliminarily suggests that continued research on brief practices of mindfulness may be useful given that students liked performing the strategy and perceived it as being somewhat helpful.

Limitations and Future Research

The sample size was small with less than 30 participants per condition. Although resources cite 20-25 participants as adequate (Tabachnick & Fidell, 2013), a larger sample size would be beneficial. In addition, students who completed the study were not particularly diverse in age, sex, and ethnicity; results may not be generalizable to broader populations, and conclusions

must be drawn cautiously. Also, the sample scored lower on the DASS-21 than expected. These low scores might account for the non-significant findings; participants reported not experiencing depression, anxiety, and stress throughout the entire study, and as such, the mindfulness manipulations may not have been seen as useful given low scores.

The use of the brief practice among novices of a mindfulness practice may be a limitation. Previous research supports that longer practices are necessary for mastery (Kabat-Zinn, 2003); thus, it may be necessary for novice participants to learn the strategy through a longer practice before moving to the shorter sessions. Participants indicated that they had either limited or no exposure to a mindfulness strategy. Future research might benefit from either testing the use of brief strategies for people who have exposure or use the brief strategy over a longer period after participants have more time to utilize the strategy in their daily routine. It also may be beneficial to utilize a longer initial session to better train participants to use the strategy correctly before engaging in shorter practices guided by the mobile application.

An additional limitation may involve only examining two mindfulness practices. Future research might consider examining other mindfulness-based strategies and how using one strategy versus a combination of strategies impacts the variables of interest over time. Finally, the use of a mobile-phone application may be a limitation. More research is needed for evaluating the quality of engagement in practice while listening to a recorded voice compared to an in-person guide (Mani et al., 2015). College-age students use cell phones for social interactions, coordination with others, and even time management. If, during the practice guided by the mobile-phone application, the participants' phone rang for a social reason and/or notification, the participants may have been distracted whereas when guided in-person, the participants may not have their phone out.

Despite the limitations, this research provides information on the relationship between mindfulness and areas of an individual's daily experiences. Participants reported feeling the mindfulness strategy was a benefit, which may support the likelihood of the participants continuing to engage in the practice. It is important to understand the effectiveness of shorter, more accessible mindfulness strategies. College students are especially important to focus on in mindfulness research, as they may benefit from the shorter practices.

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