

Reducing Burnout through a Mindful Meditation Mobile App: A Randomized Controlled Trial

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Abstract

Given recent findings on the positive effects of mindful meditation interventions, exploring its benefits through new delivery mediums is valuable. The purpose of this study was to explore the effects of a mindful meditation intervention on burnout and mood using a mobile app (*Smiling Mind*) in 105 working adults in the United States. Mobile apps allow for standardized delivery in busy populations at a low cost and high convenience. Interventions can be conducted over the internet with no requirement of travel or professional training. This was a randomized controlled trial design conducted over an 8-week period. Teachers and staff from a rural public school system as well as city agency employees were randomly assigned to the intervention ($N = 51$) or wait-list control group ($N = 54$). The intervention group used the app five times a week for at least ten minutes, and the control group did not. Both groups completed pre- and post-surveys and six weekly mood surveys. Results indicate that burnout significantly decreased in the intervention group only, and there were no significant changes in mood. Mindful meditation interventions using a smartphone app are an effective intervention method for reducing burnout in working adults.

Keywords: mindful meditation, mobile app, burnout, mood, intervention

1. Introduction

Given recent findings on the positive effects of mindful meditation interventions, it is important to explore its benefits when used via alternative delivery mediums in non-clinical populations. Mindfulness is defined as “the awareness that emerges through paying attention on purpose, in the present moment, and no judgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003, p. 145). The purpose of this study was to extend current research on the benefits of mindful meditation using a mobile app in a sample of working adults.

1.1 Mindful Meditation

The proliferation of mindfulness into Western culture from its origins in Buddhism began in the 1970's (see Keng, Smoski, & Robins, 2013 for review). Nevertheless, Kabat-Zinn (1994) suggested that at its heart, mindfulness is neither Buddhist, “Eastern”, nor mystical in its approach. Rather, mindfulness is the practice of observing one's thoughts without judging or controlling them, and this is not restricted to a location or religion. In this way, people can practice awareness of their thoughts, for example by focusing on their breath. By concentrating on the present moment without judgment, individuals are able to reconnect with their own lives, families, and personal wellbeing. Indeed, across clinical and non-clinical populations, mindfulness is related to several positive health outcomes (Keng et al., 2013). Originally developed by Kabat-Zinn in 1979 (Kabat-Zinn, 2003), mindfulness interventions were first standardized and conducted under the term “mindfulness-based stress reduction” (MBSR) programs. While MBSR used group settings to reduce stress-related symptoms, later iterations (e.g., mindfulness-based cognitive therapy) focused on cognitive techniques to help change participants' awareness to their thoughts and emotions.

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More recent approaches to induce mindfulness include computer-based programs, though originally these interventions did not have many interactive components. Despite limited interactive components, evidence supports the viability of such computer-based interventions on chronic pain, stress management, and depression, among other outcomes (see Chittaro & Vianello, 2014 for review). One new approach for inducing mindfulness is using mobile apps. These newer apps allow for standardized delivery at a low cost, high convenience, no need for travel to professionals/trainers, and require little training. These electronic interventions also result in positive outcomes similar to face-to-face interventions (e.g., reductions in stress, depression, and anxiety; Spijkerman, Pots, & Bohlmeijer, 2016). Though limited research has been done, early findings show that app-based interventions improve the psychological and environmental quality of life for individuals when assessed three months after the intervention (van Emmerik, Berings, & Lancee, 2018). The novelty of using apps to induce mindful meditation indicates the need to identify which apps might be most helpful for individuals. In a recent study (Mani, Kavanagh, Hides, & Stoyanov, 2015), mindfulness-based mobile apps were evaluated to determine their quality. Apps were rated based on the quality and features of their guided meditation. Of the 23 apps evaluated, *Headspace* had the highest average followed by *Smiling Mind*. One major benefit of *Smiling Mind* over *Headspace* is that it is the highest-quality free app currently available on the market. *Smiling Mind* is a user-friendly mobile app aimed at providing mindful meditation experiences; it is available for both iOS and Android devices. This app uses recordings with soothing voices to talk a user through various mindfulness-related topics. After downloading *Smiling Mind*, the user is asked questions about their age, occupation, and which area of their life they wish to improve. The user is then prompted to listen to a series of three recordings designed to explain what mindfulness is and how to begin practicing. After the initial setup, the app suggests programs based on the user's demographics. A program is a series of sessions with a similar theme (i.e., responding to stress). After selecting a program, the user begins listening to the first session. Sessions vary from 1 minute to over 20 minutes in length. Some sessions ask the user to sit in a quiet private room while a voice talks them through the steps of that particular session, such as a body scan or single sense focusing. Other sessions have the user do a mindful activity while the voice prompts where the user's focus should be, such as brushing teeth while focusing on the feeling of one area of the mouth at a time, or walking down a sidewalk while only focusing on what can be heard. After completing a session, the home screen automatically removes that session and the next one is ready to start.

1.2 The Benefits of Mindful Meditation

Many U.S. adults (79%) report feeling stress in their daily lives, mainly as a function of children and work (Saad, 2017). This stress puts people at risk for poor mood and burnout, especially when they cannot regulate their emotions (Martínez-Monteaudo, Inglés, Granados, & Aparisia, 2019). Mood is defined as the experience of emotions caused by evocative situations (Mayer, Salovey, Gombert-Kaufman, & Blainey, 1991). Burnout is broadly defined as "a constellation of physical fatigue, emotional exhaustion, and cognitive weariness resulting from chronic stress" (Melamed, Kushnir, & Shirom, 1992, p. 53). In one survey of 146 countries, Gallup (2018) found that one in five working adults across the world report high levels of anger and sadness. Quite succinctly, the world is more stressed than has ever been measured previously. Currently, mindful meditation is considered an effective therapeutic approach. There are positive effects of mindfulness interventions on factors such as stress, affect, irritability, anxiety, and depression (Economides, Martman, Bell, & Sanderson, 2018; Ly et al., 2014; Spijkerman et al., 2016). It appears that engaging in thoughtful awareness of one's surroundings without judgment helps moderate strong emotions (Baer, 2003). However, various programs exist. For example, mindfulness-based stress reduction (MBSR) interventions have strong effects on psychological variables, and pure mindful meditation is beneficial for mindfulness-related variables (Eberth & Sedlmeier, 2012). Recent meta-analyses suggest that mindful meditation interventions are successful at improving emotional outcomes like anxiety and depression, but less so for cognitive outcomes (Eberth & Sedlmeier, 2012; Goyal et al., 2014; Sedlmeier et al., 2012). In two studies involving healthcare professionals, a mindfulness intervention was found to reduce burnout (Kang et al., 2019; Shapiro, Astin, Bishop, & Cordova, 2005). Research on mindful meditation and mood is mixed; one meta-analysis found significant improvements in mood (Hofmann, Sawyer, Witt, & Oh, 2010), and another meta-analysis found no effect on mood (Goyal et al., 2014). Given that some occupations, like teaching, report high levels of stress and burnout (Herman, Hickmon-Rosa, & Reinke, 2018), finding methods to mitigate the negative effects of a stressful workplace is critical. Overall, participants rate mindful meditation programs favorably (see Baer, 2003 for review), though limitations exist (e.g., participants who dropped out may experience lower rates of satisfaction).

Previous research on participant satisfaction in mobile app studies suggest that individuals find the app interventions helpful (47.5%) and enjoyable (20.3%) and held overall positive opinions (66.1%) about the use of an app to induce mindful meditation (Chittaro & Vianello, 2016).

Hypothesis 1 (H1): Participants in the mindful meditation condition will experience reduced burnout compared to the control condition.

Hypothesis 2 (H2): Participants in the mindful meditation condition will experience more positive moods compared to the control condition.

Hypothesis 3 (H3): Participants in the mindful meditation condition will report satisfaction with the intervention.

2. Method

2.1. Participants

This study included 118 participants recruited from a local school system and city agencies. One participant was removed because they declined to provide consent. Another participant dropped out of the study due to time constraints. Eleven potential participants read the informed consent and did not continue further, resulting in a final sample size of 105 participants. The majority of participants were female ($N = 89$) and white ($N = 104$). Most participants had either a 4-year degree ($N = 40$) or a professional degree (e.g., Master's; $N = 42$). The majority were also full-time employees ($N = 98$). Of the professions represented, the majority were teachers ($N = 40$), though a broad range of job titles were represented (e.g., nurses, law enforcement officers, educational administrators, paraprofessionals, library clerks, and city government employees).

2.2 Materials

2.2.1 Burnout. An overall measure of burnout (Melamed et al., 1992, average α across all time points = .90) was used.

Participants responded to eight items (e.g., "I feel physically exhausted") using a 7-point Likert-type scale from 1 = Never to 7 = Always. Higher scores indicate higher burnout.

2.2.2 Mood. Participants were asked about their current mood using Mayer and Gaschke's (1988; average α across all time points = .87) scale. Participants responded to 16 items (e.g., "lively", "tired") using a 4-point Likert-type scale from 1 = *Definitely do not feel* to 4 = *Definitely feel*. Higher scores indicate a more positive mood.

2.2.3 App use. Two items asked participants how many times they completed a session and how many minutes, on average, they spent in a session.

2.2.4 Intervention feedback. Participant satisfaction items were adapted from Grove and Ostrof (1991). Participants were asked, "Overall, how would you rate this program?" on a 1-5 scale from *Poor* to *Excellent* and how they felt about the length of the program (*Too long*, *Too short*, or *Just right*).

2.3 Design

This was a randomized controlled trial; participants were randomly assigned to the intervention or wait-list control group using the Microsoft Excel function. The 8-week study included a pre-survey, six weekly surveys, and a post-survey. See Figure 1 for intervention phases and sample sizes (Melnik & Morrison-Beedy, 2012). See Table 1 for measure use over time.

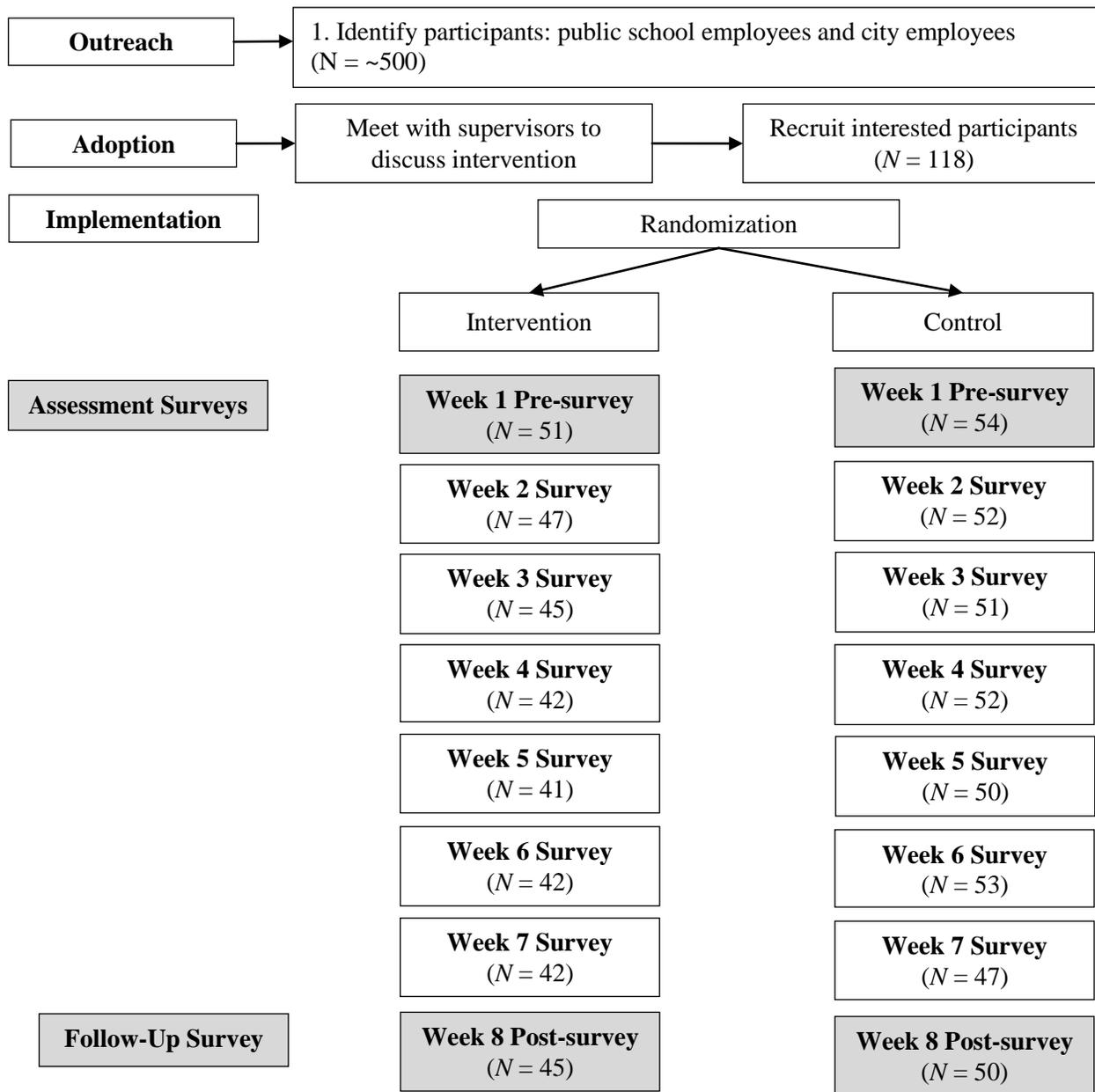


Figure 1. Intervention flow and sample sizes

Table 1. Measures used during the intervention

Pre-survey	Week 2 – Week 6 Surveys	Post-survey
Burnout	Mood	Burnout
Mood	App use	Mood
Demographics		Intervention satisfaction
		App use

2.4 Procedure

After receiving IRB approval, participants who were over the age of 19 and employed by the local school system or city agency were recruited by researchers via a 2-minute YouTube recruitment video, email, and flyers. The recruitment video was developed and edited by the university’s communications lab. After a 10-day recruitment period in February 2019, potential participants ($N = 118$) were randomly assigned to the meditation or wait-list control group.

After random assignment into groups, participants completed the pre-survey through Qualtrics, an online survey software (February 2019). One week after collecting the pre-survey, the meditation group was emailed instructions to download the *Smiling Mind* app on a mobile phone or tablet and use it five times a week for at least ten minutes. The wait-list control group was not asked to download the *Smiling Mind* app. To remain consistent throughout the intervention, weekly survey emails were sent to participants at 6 am on Mondays. The post-survey was completed one week after the end of the intervention (April 2019). Participants were compensated with electronic Amazon gift cards for completing the pre-survey (\$10) and post-survey (\$10). After the intervention, participants were emailed a report of the findings and instructions to download the app.

3. Results

We used SPSS v.26 to analyze the results. The box plot indicates that there was one outlier in burnout greater than 1.5 box-lengths. This participant was unusually high in burnout at both time points but was kept in the dataset. Shapiro-Wilk’s test indicates burnout was normally distributed ($p > .05$). There was homogeneity of variances according to Levene’s test of quality of error variances ($p > .05$) and homogeneity of covariances according to Box’s test ($p = .48$). There was a statistically significant interaction between condition and time, $F(1,93) = 9.37, p = .003$, partial $\eta^2 = .09$. There was no statistically significant difference between the mindful meditation group and the control group in the pre-survey burnout, $F(1,103) = .60, p = .44$, partial $\eta^2 = .01$. There was a statistically significant difference between the groups in post-survey burnout, $F(1,93) = 4.68, p = .03$, partial $\eta^2 = .05$. In other words, a 6-week mindful meditation app significantly reduced burnout in working adults compared to the control group (see Table 2 and Figure 2). Hypothesis 1 was supported.

Table 2. Mean scores before and after the intervention

	N	Mean	SD
Pre-survey Burnout			
Meditation	45	3.89	1.19
Non-meditation	50	3.77	1.18
Post-survey Burnout			
Meditation	45	3.10	1.01
Non-meditation	50	3.61	1.25
Pre-survey Mood			
Meditation	45	2.85	.41
Non-meditation	50	2.94	.39
Post-survey Mood			
Meditation	45	3.16	.48
Non-meditation	50	3.02	.44

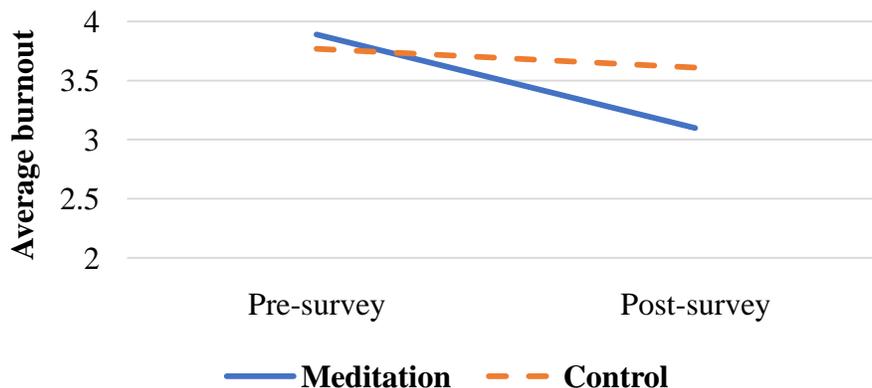


Figure 2. Changes in burnout from before and after the Smiling Mind app intervention

The boxplot indicates that there were two outliers in mood greater than 1.5 box-lengths. One participant reported an unusually high/positive mood and one an unusually low/negative mood in the meditation group, but both were kept in the dataset. Shapiro-Wilk's test indicates that mood was normally distributed ($p > .05$), except for the meditation group in the post-survey ($p = .03$). There was homogeneity of variances according to Levene's test of quality of error variances ($p > .05$) and homogeneity of covariances according to Box's test ($p = .85$). There was a statistically significant interaction between condition and time, $F(1,93) = 5.25, p = .02$, partial $\eta^2 = .05$. There was no statistically significant difference between the mindful meditation and control group in the pre-survey mood, $F(1,103) = 2.55, p = .11$, partial $\eta^2 = .02$. There was no statistically significant difference between the groups in post-survey mood, $F(1,93) = 2.17, p = .14$, partial $\eta^2 = .02$. In other words, positive mood significantly increased in both groups, and the intervention was not the cause (see Figure 3). Hypothesis 2 was not supported.

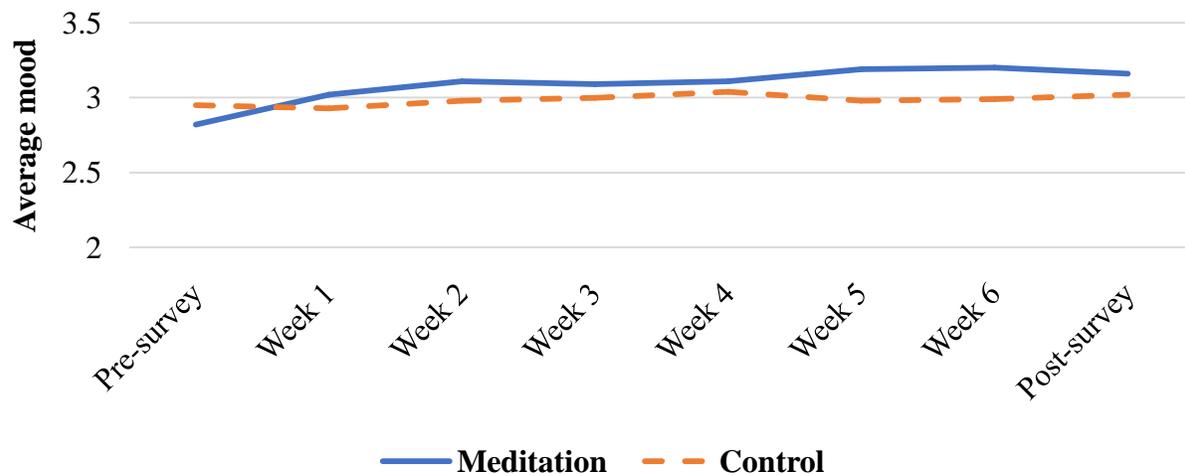


Figure 3. Change in mood over time between the two groups.

Overall, participants rated the program as Good or Very Good ($M = 3.69, SD = .67$). Most participants reported that the length of the program was just right, 76.5%; 7.8% found it too long, 3.9% too short; and 11.8% did not respond. Participants reported completing an average of 5.74 sessions per week over the six weeks and spent an average of 17.14 minutes in a session. Hypothesis 3 was supported.

4. Discussion

The aim of this study was to determine the effects of using a mindful meditation app on employees' burnout and mood. Mindful meditation reduces or buffers the effects of burnout by utilizing biological and psychological strategies such as breathing, visualization, and directing attention inward (Abenavoli, Jennings, Greenberg, Harris, & Katz, 2013), which promotes individuals to live in the present and reduce their reactions to stressors. In this study, inducing mindful meditations using an app significantly reduced burnout but not mood for participants. Specific to the results regarding burnout, a recent Gallup poll suggests that approximately 23% of full-time employees experience frequent burnout (Wigert & Agrawal, 2018). Given the evidence that workplace exposure to stressors is estimated to cost approximately \$125 billion per year (Goh, Pfeffer, & Zenios, 2015), finding effective methods to reduce stress and burnout is critical to reducing healthcare costs and mortality rates for United States workers. Mindful meditation interventions using a mobile app offer an efficient alternative to in-person interventions (Economides et al., 2018) and are effective at improving psychological health outcomes like burnout. The current research has important implications for busy individuals who are in positions with high burnout, such as teaching. Specifically, because teachers are often overworked, put in many extra hours (Herman et al., 2018), and may not be able to afford or find the time to participate in traditional intervention practices, this study provides support that using a mobile app to induce mindful meditation is effective, efficient, and affordable. Caution must be used when generalizing these findings to others due to the narrow participant pool of teachers and city employees in a rural Midwest town of about 33,000 people in the United States. However, these results offer a great foundation to recognize potential benefits of a well-recognized activity (mindful meditation) using a mobile app on burnout. That said, a follow-up study is planned that includes individuals in very high stress conditions such as law enforcement and military service.

Additional adjustments such as preferred duration and frequency of the app-based mindful meditation and identifying other psychological factors that may be positively impacted are also being explored. The goals are to ensure the saliency of the intervention is great enough without encumbering the use of the app due to time limitations of individuals, as well as to determine whether the app-based induction of mindful meditation can have additional benefits. The result regarding mood is consistent with two previous meta-analyses that had contradicting findings regarding mood; one study found significant improvements in mood (Hofmann et al., 2010), and the other found no effect on mood (Goyal et al., 2014). Given the contradicting results, further investigation of the effects of mindful meditation is warranted (Toneatto & Nguyen, 2007). This need for additional research is also poignant regarding the use of a device-based mindful meditation intervention as done in this study due to the potential benefits of efficiency and affordability.

Since many of the participants in this study were frustrated that they were not receiving the intervention, another alteration of the research is use of an active control group that completes other tasks/activities (e.g., listening to an audio book about mindful meditation; Economides et al., 2018) rather than a simple wait-list-control group. Another option is participants could be randomly assigned to participate in an in-person mindful meditation intervention versus a mobile app intervention. These methodological changes require additional consideration as this research moves forward. Finally, this research adds significantly to the literature supporting the use of mindful meditation to decrease burnout in some high stress jobs. Additionally, these findings provide evidence that improvement in employee burnout may be obtained by using the efficient and affordable means of a device-based app. Again, future research should expand the diversity of the population studied and salience of the intervention needs to be assessed and altered.

Acknowledgement: University of Nebraska at Kearney Mitchell Center Media Lab

Funding: This project was supported by a Psi Chi Undergraduate Research Grant and the University of Nebraska at Kearney Undergraduate Research Fellowship (URF).

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