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Major Article

Mindfulness and Alcohol Problems in College Students: The Mediating Effects of Stress

Jamie S. Bodenlos, PhD; Marleah Noonan, BA; Stephanie Y. Wells, BA

Abstract. Objective: To examine the relationship between mindfulness and alcohol problems in college students, as well as the role of stress as a mediator in this relationship. **Participants:** Participants were 310 students from a small, private college in the Northeast. **Methods:** Students completed self-report measures, including the Perceived Stress Scale, the Five Facet Mindfulness Questionnaire, and the Rutgers Alcohol Problems Index. **Results:** Mindfulness was negatively correlated with alcohol problems and stress, whereas stress positively correlated with alcohol problems. Results implicated stress as fully mediating the relationship between mindfulness and alcohol problems. Alcohol problems were negatively correlated with the Acting With Awareness and Describing Experience facets of mindfulness. **Conclusion:** Mindfulness-based stress reduction or other mindfulness programs may be useful in decreasing alcohol problems on college campuses via the effects on stress.

Keywords: alcohol, college, mental health, mindfulness, stress

Heavy episodes of drinking are a common part of the culture on many college campuses.¹⁻³ Hingson et al found that 44.7% of college students aged 18 to 24 consumed 5 or more drinks on a single occasion in the past month.⁴ College students have also been found to participate in weekly binge drinking more than their same-age peers who are not in college.⁵ Heavy drinking during college years has been associated with a wide array of negative consequences such as poor academics, neurological deficits, memory problems, psychological problems, and strained relationships with family and peers.^{6,7} Alcohol-related injuries, including motor vehicle accidents, are one of the leading causes of morbidity and mortality among this age group.⁴ In 2005, 1,825 college students died from alcohol-related

unintentional injuries, including motor vehicle accidents.⁴ The high prevalence of excessive drinking in college is concerning because college students defined as frequent heavy episodic drinkers have been found to be 19 times more likely to be classified with alcohol dependence than nonheavy episodic drinkers.⁶ Further, there is evidence suggesting that binge drinking during college years increases risk for patterns of alcohol abuse and dependence later in life.^{8,9}

One risk factor for high rates of problematic drinking in college may be heightened stress levels. College students tend to endure particularly high levels of stress stemming from academic responsibilities and social pressures,¹⁰⁻¹² and those students who do not find healthy ways to cope with stressors can suffer from a variety of negative consequences.¹³⁻¹⁵ In college students, high stress levels related to college life, greater hours worked daily, trauma, and posttraumatic stress disorder symptoms have been linked to alcohol use and alcohol-related problems.¹⁶⁻¹⁸ Finding healthier ways to cope with stress may aid in reducing the use of substances as a strategy.¹⁹

Mindfulness-based strategies are frequently used in medical and mental health settings to aid in stress reduction. Originally derived from Buddhism, mindfulness encourages a state of conscious presence based on an accepting and nonjudgmental attitude and purposeful awareness of one's moment-to-moment experiences.²⁰ Mindfulness has also been associated with improved emotional well-being and social functioning of adolescents. More specifically, as a general character trait, mindfulness has been found to be positively correlated with friendship extensivity, popularity, and general positive emotion.²¹ In contrast, mindfulness has been found to be negatively correlated with stress and other negative emotions in adults²¹ and college students.²²

Mindfulness interventions have been shown to reduce stress and to improve both physical and psychological health in clinical populations of people suffering from a wide variety of disorders, including cancer, chronic pain, heart disease,

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high blood pressure, depression, and anxiety.^{23–26} Research with nonclinical populations has also shown mindfulness-based interventions to be effective in reducing perceived stress levels, anxiety, and tension.^{27,28} Among individuals with substance use disorders (SUDs), mindfulness-based interventions have been effective as measured by a variety of outcomes, including quit rate, retention rate, and acceptability of treatment.^{29–31} Furthermore, these interventions have been successful at reducing relapse in SUDs patients.^{32–34} Although mindfulness interventions for problematic alcohol behaviors have not been tested in college populations, cross-sectional research has found that certain facets of mindfulness such as acting with awareness and describing thoughts/feelings have been negatively associated with alcohol use in college students.³⁵

Lastly, it has been hypothesized that mindfulness-based interventions work in substance use populations via the effects on stress.^{31,36} Stress is often a precipitator to relapse^{37,38} and therefore if mindfulness helps decrease stress levels, it may aid in preventing relapse. People who have higher levels of mindfulness may be less likely to experience negative consequences from stress, such as alcohol problems. Marcus and colleagues examined the impact of a mindfulness-based intervention on stress levels in a substance abuse therapeutic community, and their results partially support this theory. Following the intervention, awakening cortisol levels were significantly lower but self-reported stress symptoms were not.³⁹ It has also been found, among a predominantly African American male sample of alcohol-dependent adults, that mindfulness training significantly reduced stress and may disrupt the stress-precipitated relapse among this group.⁴⁰

This study aimed to examine the relationship between mindfulness, stress, and alcohol problems among college students. We hypothesized that higher levels of mindfulness would be negatively associated with stress and alcohol problems. Additionally, our primary objective was to further explain this relationship by examining stress as a potential mediator in the relationship between mindfulness and alcohol problems in a college population. Given that mindfulness is associated with decreased stress and substance use in the general population, we predicted that stress would fully mediate the relationship between mindfulness and problematic alcohol use, indicating stress as the mechanism underlying a relationship in which higher mindfulness would be related to lower alcohol problems. This relationship has not yet been examined in a college population. In order to further elucidate the relationship between mindfulness and substance use, it is necessary to explore the specific aspects of mindfulness that influence alcohol use. Thus, the present study further sought to investigate how various facets of mindfulness relate to alcohol use and problems in a college population.

METHODS

Participants were 310 undergraduate college students (68% female; 32% male) recruited from a small liberal arts college in the Northeast. Participants were between the ages of 18 and 24 years ($M = 19.7$, $SD = 1.3$) and included 40%

freshmen, 24% sophomores, 20% juniors, and 16% seniors. The majority of the sample was Caucasian (85%). Our sample was not significantly different than the student population at this college, which is 83% Caucasian and 42% male ($p = ns$).

After approval by the institutional review board, participants were recruited using several different recruitment strategies. Flyers providing information about the study were placed around campus and information about the study was sent via campus-wide e-mail. Additionally, the 2 research assistants on this project went to classes in several academic departments and made announcements in class to students about the study. Students in the psychology department were offered extra credit or could opt to be entered into a raffle for a \$50 gift card instead. Psychology students were also given the option to complete a paper for extra credit instead of participating in a research study. All students outside of the psychology department were eligible to be entered into the gift card drawing. All participants signed an informed consent and all participation was voluntary. Participants filled out a series of self-report surveys that took approximately 20 to 30 minutes to complete. A research assistant was present at all times to answer any questions that participants may have had about the measures. To control for order effects, the scales were counterbalanced across participants. Data were collected at 2 time points: Spring semester in 2010 and Spring semester in 2011.

Demographic data and lifestyle information were collected using a questionnaire developed for this study. Participant's level of subjective stress was evaluated by the Cohen's 14-item Perceived Stress Scale (PSS-14).⁴¹ The PSS-14 employed a Likert method (1 through 5) in order to measure the frequency and severity of stress, with 5 indicating the highest levels of stress. Previous studies have found the PSS-14 to be a valid and reliable measure of stress in young adult populations with $\alpha = .87$.^{42,43}

The Five Facet Mindfulness Questionnaire (FFMQ) is a 39-item questionnaire used to analyze individual's day-to-day mindfulness.⁴⁴ The FFMQ uses a Likert method (1 through 5) to determine the frequency with which elements of mindfulness occur, with 1 indicating something that never occurs and 5 indicating something that always occurs. An example question is "I make judgments about whether my thoughts are good or bad." Possible scores on the FFMQ range from 39 to 195, with overall higher scores reflecting higher levels of mindfulness. The FFMQ was derived from a factor analysis of 5 psychometrically sound mindfulness subscales: Observing Inner Experience (noticing or attending to internal and external experiences), Describing Experience (labeling internal experiences with words), Acting With Awareness (attending to one's activities of the moment), Non-judging of Experience (taking nonevaluative stance towards one's thoughts and feelings), and Non-reactivity to Inner Experience (allowing thoughts and feelings to come and go and not get caught up in them).⁴⁵ The FFMQ has reliability alpha coefficients ranging from .75 to .91 for the subscales.⁴⁶

The Rutgers Alcohol Problem Index (RAPI) was used to assess problematic alcohol use in college students. The

RAPI is a 23-item scale⁴⁷ that asks participants to assess how often they encounter various harmful consequences of alcohol, using a Likert scale of 0 to 3, with 0 indicating a negative behavior never occurring and a 3 indicating a negative behavior occurring more than 5 times in the past year. A total score on the RAPI can range from 0 to 69, with a higher score indicating a higher instance of problematic drinking behaviors.

The RAPI has been commonly used in assessing and screening for alcohol problems in adolescent and college-aged populations^{48,49} and has been recognized as a reliable and valid measure of harmful drinking habits.⁵⁰ The RAPI has also been shown to correlate well with other measures of alcohol misuse, including the Adolescent Alcohol Involvement Scale, Alcohol Dependence Scale, *Diagnostic and Statistical Manual for Mental Disorders (DSM-III, DSM-III-R)*, in clinical populations.⁵¹ Martens et al⁵⁰ have specifically recognized the RAPI as a reliable and valid measure of identifying alcohol abuse/dependence symptoms ($\alpha = .75$) as well as identifying alcohol consumption patterns that cause personal/social consequences ($\alpha = .73/\alpha = .68$). According to previous research, an average score on the RAPI for a nonclinical sample of 18 year old adolescents who used alcohol was 7.4 for females and 8.2 for males.⁵²

Data were analyzed using PASW Statistics 18 (SPSS, Chicago, Illinois). Means and standard deviations of all variables were calculated and sex differences on all variables were examined. Hierarchical linear regression analyses were used to examine the role of stress as a mediator in the relationship between mindfulness and alcohol problems. Following the Kenny and Baron approach,⁵³ the following steps were involved: (1) establishing the correlation between the independent (mindfulness) and dependent (alcohol problems) variables of interest, (2) establishing the association between the independent variable (mindfulness) and the mediator (stress), (3) establishing a relationship between the mediator (stress) and the dependent variable (alcohol problems), and (4) assessing the degree to which the association between the independent (mindfulness) and dependent (alcohol problems) variables weakens when controlling for the mediator. Bivariate correlations were used to examine the relationships between 5 facets of mindfulness and alcohol problems and alcohol use in the sample.

RESULTS

Means and standard deviations for all study variables are presented in Table 1. Class years (eg, freshmen, sophomore) did not differ significantly on score on the RAPI ($F[4, 304] = 1.75, p = .14$). Men scored significantly higher ($M = 9.35, SD = 9.07$) on the RAPI than females ($M = 6.52, SD = 7.61; t[302] = 2.84, p = .00$). Females reported higher levels of stress on the PSS-14 ($M = 38.25, SD = 7.02$) compared with males ($M = 36.14, SD = 8.29; t[306] = -2.29, p = .02$). Males and females did not differ on overall mindfulness (FFMQ score: $t[304] = -.17, p = .86$). However, sex differences were observed on one of the mindfulness facets, non-reactivity to inner experience, with males scoring sig-

TABLE 1. Variable Descriptives

Variable	<i>M</i>	<i>SD</i>	Range
RAPI Total	7.41	8.20	0–47
PSS-14 Total	37.58	7.51	20–59
FFMQ Total	130.60	16.43	79–175
Observing Inner Experience	25.81	5.47	10–40
Describing Experience	28.35	5.87	12–40
Acting With Awareness	26.67	5.54	11–40
Non-judging of Experience	28.28	6.28	11–40
Non-reactivity to Inner Experience	21.54	3.64	9–33

Note. RAPI = Rutgers Alcohol Problems Index; PSS-14 = Perceived Stress Scale-14; FFMQ = Five Facet Mindfulness Questionnaire.

nificantly higher ($M = 22.14, SD = 3.64$) compared with females ($M = 21.25, SD = 3.61; t[303] = 2.01, p = .04$).

Stress as Mediator Between Mindfulness and Alcohol Problems

The criteria for step 1 of the mediation analyses was met, as mindfulness was significantly associated with alcohol problems, $\beta = -0.20$ ($p < .00$). As illustrated in Table 2, step 2 was also confirmed as mindfulness was significantly associated with stress, $\beta = -0.60$ ($p < .00$). Stress was significantly associated with alcohol problems after controlling for mindfulness, $\beta = 0.16$ ($p < .05$), which confirms step 3. Lastly, mindfulness did not remain independently associated with alcohol problems when controlling for stress, $\beta = -0.11$ ($p = .12$) (see Figure 1). Thus, our model did support stress as a full mediator between mindfulness and alcohol problems. A Sobel test indicated that the indirect effects of mindfulness on alcohol problems through stress was significant ($Z = -3.82, p < .00$). Post hoc power analysis indicated that the power to detect obtained effects at the .05 level was .96 for the overall regression in the prediction of alcohol problems.

Bivariate correlations between the study variables are presented in Table 3. Overall, mindfulness correlated with all of the facets of mindfulness and negatively correlated with alcohol problems and stress. Alcohol problems were negatively correlated with the acting with awareness and describing experience facets of mindfulness and positively correlated with stress.

COMMENT

The present study examined the associations between mindfulness, stress, and alcohol use in a college population. As predicted, mindfulness was negatively associated with stress and alcohol problems. Additionally, stress was positively associated with alcohol problems. The primary aim of this study was to examine stress as a mediator in the relationship between mindfulness and alcohol problems among college students. Consistent with the hypotheses, results from mediational analysis indicate that the relationship between mindfulness and alcohol problems can be accounted for by level of stress.

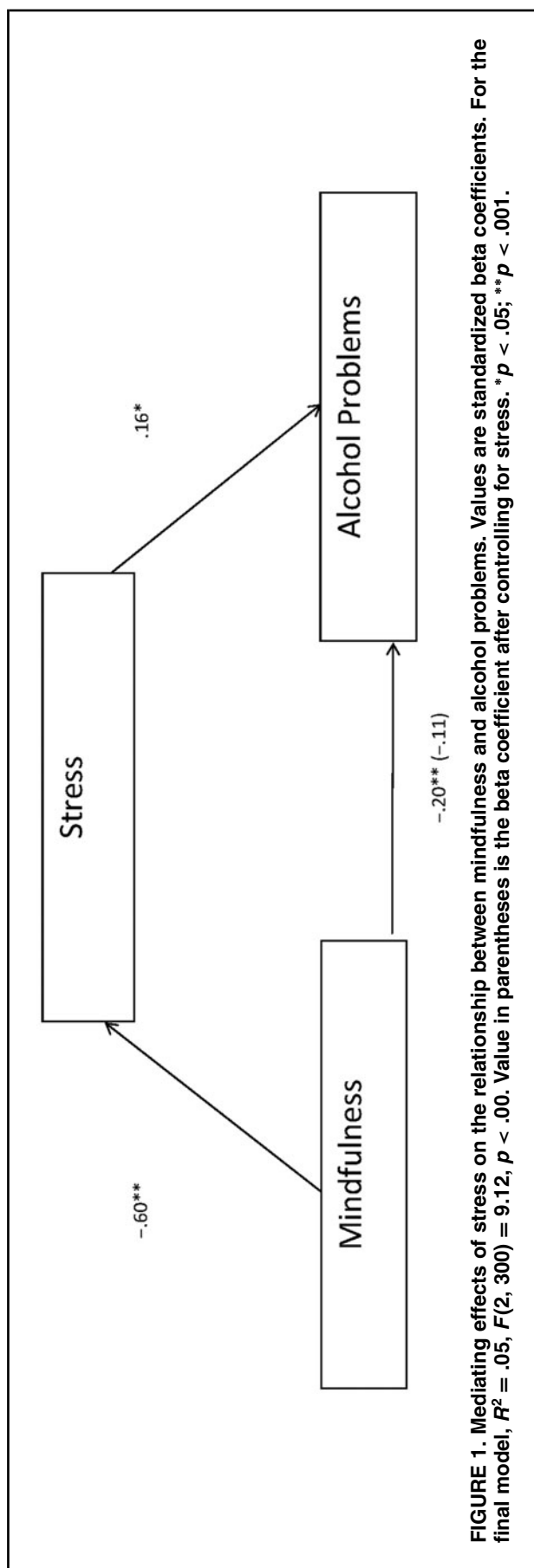


TABLE 2. Mediated Regression Analysis of Stress Mediating Mindfulness and Alcohol Problems

Variable	R	R ²	B	SE	β
Step 1					
FFMQ associated with RAPI	.204	.041**	-.102**	.028	-.204**
Step 2					
FFMQ associated with PSS-14	.598	.357**	-.274**	.021	-.598**
Step 3					
PSS-14 associated with RAPI	.227	.051**	.247**	.061	.227**
Step 4					
PSS-14 associated with RAPI when controlling for FFMQ (PSS-14 and FFMQ)	.240	.058**	.174 -.054	.076 .035	.159 -.108

Note. FFMQ = Five Facet Mindfulness Questionnaire; RAPI = Rutgers Alcohol Problems Index; PSS-14 = Perceived Stress Scale-14.

* $p < .05$; ** $p < .01$.

It is not surprising that stress mediated the relationship between mindfulness and alcohol problems given the extant literature suggesting that mindfulness-based interventions may reduce alcohol problems via a reduction in stress.^{31,36} Additionally, this finding is consistent with previous literature on the success of mindfulness-based interventions in treating substance abuse^{29–31} and preventing relapse.^{32–34} Our data suggest that mindfulness-based interventions may help to reduce problematic alcohol use in college-aged populations by helping students to better manage stress through increasing their mindfulness levels. However, given the correlational nature of our study, more research is needed to better understand how these types of interventions may work in college students.

The various facets of mindfulness measured in the FFMQ were examined in order to better ascertain the ways in which specific aspects of mindfulness are related to stress and alcohol problems. Results indicated that all observed facets of mindfulness were negatively correlated with lower levels of perceived stress, which is consistent with previous literature.^{25,54} In particular, overall alcohol problems were negatively correlated with scores on acting with awareness and describing experience facets of mindfulness. This is consistent with the findings from a study conducted by Fernandez and colleagues who found a negative relationship between awareness-based factors of mindfulness and problematic alcohol use.³⁵ These findings suggest that students with alcohol problems may not be acting with adequate awareness of their experiences and their behaviors may feel less in their control. If individuals have higher levels of acting with awareness, they may be more immediately conscious of the effects of the alcohol they are consuming, and therefore may be likely to consume less alcohol overall. As more attentive alcohol consumers, these students may be less likely to develop alcohol-related problems as compared with their peers with lower scores on the acting with awareness facet.

The negative relationship between the describing experience facet of mindfulness and alcohol problems elucidates another important aspect of the relationship between mind-

fulness and problematic alcohol use. This result indicates that students experiencing problematic alcohol use may also have greater difficulty in articulating their feelings and experiences. Due to this difficulty with expressive coping, they may alternatively use alcohol as a way to cope with the feelings they experience.

Our findings suggest that mindfulness-based interventions may be useful in dealing with problematic alcohol use on college campuses by teaching students to cope more effectively with stress levels. Given that stress mediated the relationship between mindfulness and alcohol problems, the use of a mindfulness program, such as mindfulness-based stress reduction (MBSR),⁵⁵ may be helpful in enhancing mindfulness and decreasing stress and alcohol misuse. Preliminary evidence suggests that mindfulness-based interventions can help students reduce stress. A brief 6-week mind/body intervention resembling MBSR training was found to be effective in reducing psychological distress, anxiety, and perceived stress in college students.⁵⁶ Furthermore, MBSR training has been found to be an effective stress management intervention for medical students, leading to lower self-reported anxiety, reduced psychological distress, increased empathy levels, and higher scores on a measure of spiritual experiences.^{57,58} Zgierska and Marcus also found mindfulness interventions to be effective in improving avoidant coping.⁵⁹ In a recent review of stress-reduction interventions in college students, mindfulness-based interventions were found to be efficacious and their use has been encouraged among this population.⁶⁰ Although substance use was not an outcome measured in these studies, reduction in stress and enhancement in mindfulness is likely to have reduced negative health behaviors, such as problematic alcohol use. More research is needed to understand the impact of mindfulness interventions on problematic alcohol use in college students.

In an effort to teach college students how to effectively cope with stress, college administrators could disseminate MBSR trainings for all first-year students. If MBSR interventions are implemented early in one's college career, they may prevent problematic alcohol use because students can cope with stress more effectively. In particular, mindfulness

TABLE 3. Bivariate Correlations Among Rutgers Alcohol Problem Index (RAPI), Perceived Stress Scale-14 (PSS-14), and Five Facet Mindfulness Questionnaire (FFMQ) Variables

Variable	1	2	3	4	5	6	7	8
1. RAPI Total	—							
2. PSS-14 Total	.227**	—						
3. FFMQ Total	-.204**	-.598**	—					
4. Observing Inner Experience	-.045	-.164**	.461**	—				
5. Describing Experience	-.117*	-.339**	.748**	.252**	—			
6. Acting With Awareness	-.268**	-.475**	.663**	.017	.354**	—		
7. Non-judging of Experience	-.105	-.427**	.603	-.122*	.308**	.376**	—	
8. Non-reactivity to Inner Experience	-.062	-.443**	.562**	.349	.296**	.221**	.115	—

* $p < .05$; ** $p < .01$.

interventions may be able to teach students how to act with greater awareness and be more aware of their bodily sensations and in return reduce alcohol consumption. Also, a focus on teaching students to describe their experiences more accurately and become more in tune with their emotions could enhance the benefits of such interventions. Supplemental classes could then be made available to all students throughout their college careers through the wellness or counseling center on campus.

The current study had several limitations. Our study was cross-sectional; therefore, causality between variables cannot be determined. Confounding variables such as negative mood states (eg, depression) or personality traits were not accounted for in our study. Due to our use of a convenience sample, results may not be generalizable to the overall college population, particularly larger universities in urban areas. A noteworthy limitation was the lack of racial diversity of our participants. It is possible that different ethnic and cultural groups cope with stress differently and our lack of diversity limits our ability to examine these differences. Also because 40% of our sample were Freshman and the average age of the sample was 19.7 years, generalizability to older college students is limited. Given that many of our participants were students in psychology courses, this could have affected how they answered questions on the surveys or their willingness to participate. For example, it is possible that students interested in learning about psychology could have systematically different levels of self-awareness than their peers involved in other disciplines. This type of difference could have influenced the way psychology students responded on the FFMQ measure of mindfulness. Due to sole reliance on self-report measures, it is also impossible to determine the accuracy of the measurements and if social desirability played a role in how questions were answered. Furthermore, although the FFMQ has been cited as a psychometrically sound measure, it does not assess other domains of mindfulness such as self-compassion, which may contribute to the relationship between mindfulness and alcohol use.^{61,62}

The present study had methodological strengths, including the use of previously established, valid, and reliable measures. Order effects were also controlled for by coun-

terbalancing the self-report measures. In addition, this study makes an important contribution to the body of literature surrounding substance use and mindfulness, yet future research aimed at delineating the relationship between these variables is warranted. Previous researchers have used a variety of mindfulness measures and the difference in subscales may contribute to the conflicting findings in the literature. Research should continue to assess these various scales to try to determine the specific features of mindfulness that seem to be contributing to preventing alcohol problems. It is possible that individual characteristics, such as personality, may predict whether an individual uses alcohol as an enhancement or avoidant strategy. Thus, future research could try to identify predictors of varied motivations for using alcohol. Researchers should aim to study these relationships longitudinally to help determine causality in these relationships. Additionally, future researchers should examine the relationship between stress, mindfulness, and alcohol consumption amongst older students, those from various class years (eg, juniors), and a more ethnically diverse college population, as these relationships may vary by each of these demographic groups. Last, it is unlikely that the high stress levels among college populations will decrease in the near future, especially given the state of our current economy. Given the high costs of tuition and high unemployment rate, college students are facing more stress than students in the past, which means it is important for researchers and higher education administrators to try to promote coping with stress more effectively. The small body of existing literature suggests that mindfulness interventions may be successful at decreasing stress levels among college students and possibly decrease rates of substance use; however, these interventions should be further explored in this population.

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CONFLICT OF INTEREST DISCLOSURE

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article

met the ethical guidelines, including adherence to the legal requirements, of the United States and received approval from the Institutional Review Board of Hobart and William Smith Colleges.

NOTE

For comments and further information, address correspondence to Jamie S. Bodenlos, Department of Psychology, Hobart and William Smith Colleges, 217 Gulick Hall, Geneva, NY 14456, USA (e-mail: bodenlos@hws.edu).

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