Mindfulness as a mediator of the association between adverse childhood experiences and alcohol use and consequences

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HIGHLIGHTS

- Alcohol use and early adversity were examined in a sample of college students.
- Increased adversity and lower levels of mindfulness predicted alcohol outcomes.
- Mindfulness mediates the relationship between early adversity and alcohol outcomes.

ARTICLE INFO

ABSTRACT

One-third of college students report past-year heavy episodic drinking, making college student alcohol use an important area for continued research. Research has consistently linked early experiences of adversity to problematic substance use in adolescence and adulthood. Given the negative health consequences associated with heavy episodic drinking, it is imperative to identify mechanisms that contribute to this relation. Low levels of mindfulness have been linked to early adversity as well as impulsivity and alcohol use, therefore, the current study aims to examine the mediating role of mindfulness in the relation between early adversity and current alcohol use and consequences. Undergraduate students ($N = 385$) at a Midwestern university completed an online questionnaire assessing experiences of childhood adversity, trait mindfulness, and current alcohol use and related consequences. Results indicated that increased adverse experiences and lower levels of mindfulness predicted both increased alcohol consumption and consequences ($ps < 0.025$), with mindfulness mediating the relationships. Mindfulness is a predictor of alcohol outcomes and appears to mediate the relation between early adversity and alcohol use and consequences. Findings suggest that students with a history of adversity are more likely to exhibit lower levels of mindfulness, which may lead to an increase in alcohol consumption and consequences in early adulthood. Targeted alcohol intervention efforts that incorporate mindfulness skills may be particularly beneficial for those who have experienced early adversity.

1. Introduction

Hazardous alcohol use is a common occurrence among college students. According to a national survey, 39% of full-time college students reported *heavy episodic drinking* (HED; i.e., 4 drinks over a period of 2 hours for women, 5 drinks for men), and 12.7% reported heavy drinking (i.e., 5 or more episodes of HED within one month) in the last 30 days (Substance Abuse and Mental Health Services Administration, 2014). Furthermore, college students consistently demonstrate more frequent HED than their non-college counterparts (Substance Abuse and Mental Health Services Administration, 2014), implicating the college environment a risk factor for problematic alcohol use. Problematic alcohol use may result in a number of immediate consequences such as

unintentional injury, physical assault, and sexual assault (Hingson, Zha, & Weitzman, 2009). Due to the high prevalence and potential severity of consequences, college student alcohol use continues to be an important area for research.

In attempts to better understand these high rates of risky alcohol use in college students, research has examined early experiences that shape drinking behavior in adolescence and early adulthood (Dube, Anda, Felitti, Edwards, & Croft, 2002; Rothman, Edwards, Heeren, & Hingson, 2008). Adverse childhood experiences (ACEs), defined as instances of childhood abuse, neglect, or household dysfunction (Felitti et al., 1998), have been linked to problematic drinking in early adulthood (Mersky, Topitzes, & Reynolds, 2013). Research shows that ACEs – such as exposure to physical or sexual abuse – are associated with earlier

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initiation of alcohol use, heavier alcohol use, alcohol dependence later in life, and with other health risk behaviors such as illicit drug and tobacco use (Dube et al., 2006; Enoch, 2011). Importantly, the more adversity (i.e., higher frequency or chronicity) individuals are exposed to early on, the greater their use of alcohol, tobacco, and other substances (Dube et al., 2002; LeTendre & Reed, 2017). Studies have found this relationship in many samples, including older adult (Choi, DiNitto, Marti, & Choi, 2017) and minority young adult samples (Mersky et al., 2013). As the literature consistently suggests, experiencing adverse events early in life increases risk of substance use and poor health outcomes in adulthood. However, mechanisms by which this association occurs are still being investigated.

There is likely no simple explanation to describe how early adverse experiences contribute to substance use in adulthood. One model by Lovallo (2013) suggests adverse experiences alter frontolimbic function, which in turn reduces stress reactivity, alters cognition, and contributes to difficulties regulating affect. Taken together, these outcomes may lead to impulsive behaviors that result in negative health behaviors, such as risky substance use. Consistent with this theory, difficulties with emotion regulation are positively associated with experience of alcohol-related consequences (Dvorak et al., 2014), implicating interventions that decrease maladaptive emotional responses in reducing negative consequences of substance use. Mindfulness-based interventions may be particularly helpful, as they have demonstrated effectiveness for reducing substance use and increasing behavioral regulation (Bowen et al., 2014; Keng, Smoski, & Robins, 2011).

Mindfulness, typically defined as a nonreactive, nonjudgmental awareness of thoughts, emotions, behaviors, and sensations in the present moment, has been linked to higher levels of self-control and goal achievement (Brown & Ryan, 2003; Masicampo & Baumeister, 2007) and lower levels of impulsivity (Murphy & MacKillop, 2012; Peters, Erisman, Upton, Baer, & Roemer, 2011), which is particularly important for understanding substance use (Verdejo-García, Lawrence, & Clark, 2008). Research investigating the role of mindfulness in substance use supports higher levels of mindfulness being associated with decreased alcohol consumption and consequences (Fernandez, Wood, Stein, & Rossi, 2010; Shorey, Brasfield, Anderson, & Stuart, 2014; Smith et al., 2011). It also appears that increasing mindfulness can result in reductions in certain aspects of impulsivity. For instance, mindfulness skills training for individuals with Borderline Personality Disorder has shown some promise in improving impulsivity on behavioral tasks, such as abilities to delay gratification (Soler et al., 2012, 2016). Further, individuals with higher levels of mindfulness have demonstrated increased use of strategies that mitigate the consequences of alcohol use, such as using a designated driver or spreading out drinks, with findings suggesting that trait mindfulness moderated the relation between protective behavioral strategy use and experience of alcohol consequences (Brett, Leffingwell, & Leavens, 2017). Due to growing evidence supporting associations between mindfulness and alcohol use and its consequences, researchers have integrated mindfulness within interventions for substance use. Mindfulness-based relapse prevention (MBRP) has been found to significantly decrease cravings for alcohol, heavy drinking and drug use compared to treatment as usual (Bowen et al., 2014; Witkiewitz & Bowen, 2010), highlighting the importance of mindfulness in decreasing substance use. It is plausible that deficits in mindfulness skills may lead to future problems with substance use, representing a potential mechanism by which increased adverse experiences leads to increased alcohol consumption and consequences.

Extant literature demonstrates that mindfulness can play a significant role in alcohol use and related consequences (Bowen et al., 2014; Bowen, Witkiewitz, Dillworth, & Marlatt, 2007; Fernandez et al., 2010), however, less is known regarding the relation between ACEs and trait mindfulness. Recent research suggests that sexual assault (Elices et al., 2015) and psychological maltreatment have both been linked to decreased levels of mindfulness (Michal et al., 2007). This relation between ACEs and mindfulness is posited to lead to poorer physical and mental health outcomes. For example, one study demonstrated self-compassion, a larger conceptual understanding of mindfulness, partially mediated the relation between chaotic childhood family functioning and anxiety and depression in adolescents and adults, lending support to the possibility that deficits in mindfulness contribute to negative health outcomes (Neff & McGehee, 2010). Finally, early life adversity predicts numerous cognitive and behavioral outcomes, including poorer working memory, reduced self-regulation, and higher neuroticism and depressive scores (Lovallo, 2013), all of which have implications for engagement in health-risk behaviors (Dvorak et al., 2014; Lovallo et al., 2013). Because mindfulness is negatively related to facets of impulsivity (Peters et al., 2011), it is possible that similar mechanisms may explain relations between ACEs and mindfulness, which in turn may predict substance use and other health risk behaviors. Taken together, it may be that early adverse experiences lead to deficits in mindfulness skills, which in turn lead to an increased likelihood to consume alcohol in a way that is more likely to lead to experience of negative consequences.

To our knowledge, only one study has investigated associations between ACEs, mindfulness, and health behaviors. Whitaker et al. (2014) found that those who experienced more types of ACEs (i.e., cumulative ACEs) were more likely to engage in health risk behaviors and report a greater number of health conditions later in life, such as headaches or back pain. Additionally, the researchers found that higher levels of mindfulness were associated with better health outcomes for all levels of adversity, highlighting the possibility that increasing mindfulness skills could lead to decreased negative outcomes for individuals with ACEs. However, no studies have examined the relations between early childhood adversity, mindfulness, and alcohol use and consequences among college students. The purpose of the current study is to fill this gap in the literature. Though mindfulness may refer to a number of constructs, the present paper intends its use to refer to multifaceted trait mindfulness as captured by the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). It is hypothesized that (1) number of different adverse experiences, alcohol use consequences, and alcohol consumption will be positively correlated, (2) mindfulness will negatively correlate with each, (3) mindfulness will mediate the relation between early childhood adversity and alcohol-related consequences, and (4) mindfulness will mediate the relation between early adversity and alcohol consumption.

2. Methods

2.1. Participants and procedures

Participants (final $N = 385$) were young adults who reported past 30-day alcohol consumption and were at least 18 years old. Participants were recruited from a large, public, Midwestern university. A brief description of the study was posted to the university's research participant pool system and potential participants selected the study from a list of other studies. Prior to completion of study procedures, participants completed informed consent. Participants completed study procedures remotely via a secure survey system and were compensated for their time with credit within their speech or psychology course for participation. All procedures were approved by the university's Institutional Review Board.

2.2. Measures

2.2.1. Demographics

Participants completed items assessing age, sex, ethnicity, and class standing. Participants also reported on marital status, Greek affiliation, and whether or not they had previously completed counseling for drug or alcohol use.

2.2.2. Alcohol use and related consequences

Participants completed the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) to assess typical alcohol consumption. Participants were asked to consider a typical week during the past month and report the number of standard drinks they consumed on each day. These responses were summed to create a total drinks per week score that was used to measure alcohol use. Alcohol-related consequences were assessed using the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler, Strong, & Read, 2005). The BYAACQ assesses participant experience with 24 alcohol-related consequences during the past 30 days. Consequences range from embarrassment during a drinking episode to experiencing black outs. Participants respond in a yes/no format. The number of affirmative answers are summed to produce a total score.

2.2.3. Mindfulness

To assess levels of mindfulness, participants completed the 39-item Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006). The FFMQ assesses five facets of mindfulness: acting with awareness, nonjudging, nonreactivity, observing, and describing. Items are rated on a 5-point Likert scale from 1 (never or very rarely true) to 5 (very often or always true). The measure and each of the facets has demonstrated appropriate psychometric properties in the assessment of mindfulness among college students (Christopher, Neuser, Michael, & Baitmangalkar, 2012). For the mediator, a total FFMQ score was calculated to measure overall mindfulness in addition to the use of facet scores.

2.2.4. Early childhood adversity

The Adverse Childhood Experiences Questionnaire - Short Form (ACES-SF; Felitti et al., 1998) is a self-report scale used to assess early childhood adversity. The ACES-SF assesses 10 negative experiences during childhood including abuse, neglect, family member mental illness, and loss of a parent. Eight items from this measure were included with participants indicating yes/no for each of the 8 experiences. The measure was summed to create a score of cumulative types of ACEs experienced out of the eight categories. The ACES-SF has been shown to be predictive of various negative mental and physical health outcomes in adulthood (Felitti et al., 1998).

2.2.5. Validity items

Four true/false questions assessed whether participants read questions thoroughly, responded honestly and accurately, or responded randomly. A final question asked participants if there was any reason their data should not be used. Participants who provided an affirmative response were asked to provide a reason for why their data should not be used. Prior to completion of validity questions, participants were informed the responses to validity questions would not impact their ability to earn course credit.

2.3. Data analytic plan

Data was collected from a total of 753 participants. Analyses were restricted to those participants that have consumed alcohol within the past month, resulting in 477 participants. Prior to conducting analyses, data were examined for validity, normality, and completeness. Based upon results from the validity items described above, 26 participants were excluded for dishonest responding and 49 participants were excluded for random responding. An additional 17 participants were removed due to incomplete data, resulting in a final sample size of 385 participants.

First, bivariate correlations between analysis variables were conducted. Following this, two regression analyses were conducted utilizing the PROCESS macro (Hayes, 2013; model 4) to test the mediational models. These analyses incorporated bootstrapping procedures set at 10,000. The bias-corrected bootstrap confidence interval for

Table 1
Descriptive statistics of the study's sample.

	M (SD)	Range
Age	20.09 (3.01)	18–54
ACES, total score	0.97 (1.46)	0–7
Drinks per week	8.41 (10.98)	0–93
Alcohol-related consequences	6.42 (4.99)	0–23
Facets of mindfulness	106.81 (17.07)	55–155

	N	Percentage
Gender		
Male	62	16.1%
Female	323	83.9%
Class standing		
Freshman	154	40.0%
Sophomore	91	23.6%
Junior	76	19.7%
Senior	60	15.6%
Non-degree-seeking	4	1.0%
Student status		
Full-time	367	95.3%
Part-time	18	4.7%
Race/ethnicity		
Caucasian or White	305	79.2%
Hispanic or Latino	25	6.5%
Biracial	6	1.6%
African American or Black	12	3.1%
Asian	2	0.5%
Pacific Islander	1	0.3%
American Indian	31	8.1%
Other	3	0.8%
Greek affiliation		
Never affiliated	196	50.9%
Current affiliation	157	40.8%
Previous affiliation only	32	8.3%
Marital status		
Never married	342	88.8%
Married	17	4.4%
Live with opposite sex partner	16	4.2%

indirect effects was used given the skew in both dependent variables, since this correction adjusts for skewness in the bootstrap sampling distribution and does not assume normality (Hayes, 2013). All analyses were completed using the PROCESS macro in SPSS (IBM Corp, Armonk, NY; Hayes, 2013; model 4). The first model aimed to determine whether mindfulness mediated the relation between cumulative ACEs and drinks per week while the second model examined if mindfulness mediated the relation between cumulative ACEs and alcohol-related consequences. A Bonferroni correction of $p < 0.025$ (0.05/2) was applied to each analysis to control for family-wise alpha inflation. Within both models, gender was entered as a covariate to attempt to control for confounding effects. Analyses were also run with age as a covariate, which did not change the initial results.

3. Results

3.1. Sample characteristics

The final sample of 385 participants consisted of primarily Caucasian (79.2%) and female (83.9%) students with a mean age of 20.09 (see Table 1). Participants reported drinking an average of 8.41 drinks per week and experiencing an average of 6.42 unique alcohol-related consequences within the past month. Additionally, participants reported consuming approximately 4.65 drinks per occasion. Overall, participants reported having moderate levels of mindfulness.

3.2. Prevalence of childhood adversity

Childhood adversity prevalence rates for the sample were calculated

Table 2

Descriptive statistics of the study's sample.

	N	Percentage
Previous enrollment of alcohol-based intervention		
None	278	72.2%
Alcohol EDU	94	24.4%
eCHUG	18	4.7%
CHOICES	14	3.6%
Previous enrollment in alcohol or drug-related counseling		
Yes	15	3.6%
No	370	96.1%
ACES type experience		
Emotional abuse	69	17.9%
Physical abuse	36	9.4%
Sexual abuse	34	8.8%
Emotional neglect	62	16.1%
Witnessing domestic violence	21	5.5%
Parental substance use	75	19.5%
Parental mental illness	75	19.5%
Parental incarceration	30	7.8%
ACES cumulative scores		
Zero ACES	218	56.6%
One ACE	74	19.2%
Two ACES	36	9.4%
Three ACES	25	6.5%
Four ACES	16	4.2%
Five ACES	11	2.9%
Six ACES	3	0.8%
Seven ACES	2	0.5%

based upon responses to the ACES-SF. Parental substance abuse and mental illness were most common in the sample (19.5% each), followed by childhood emotional abuse (17.9%). Prevalence rates of the remaining ACEs include emotional neglect (16.1%), childhood physical abuse (9.4%), childhood sexual abuse (8.8%), parental incarceration (7.8%), and witnessing domestic violence (5.5%). Cumulative number of ACES in this sample ranged from zero to seven ($M = 0.97$, $SD = 1.46$). See Table 2.

3.3. Bivariate correlations

Bivariate correlation analyses suggested that cumulative ACES was negatively associated with trait mindfulness ($r = -0.137$, $p < 0.01$) and positively associated with alcohol consequences ($r = 0.183$, $p < 0.001$). Additionally, mindfulness was negatively correlated with both drinks per week ($r = -0.151$, $p < 0.01$) and alcohol-related consequences ($r = -0.297$, $p < 0.001$). See Table 3 for the bivariate correlation results of between all analysis variables.

3.4. Mediation models

Within the first model, ACEs significantly predicted the mediator, trait mindfulness ($R^2 = 0.02$, $F(2, 382) = 4.17$, $p < 0.025$; $\beta = -1.65$,

$t(382) = -2.78$, $p < 0.025$). Additionally, the predictor variable (ACEs), mediator (mindfulness), and covariate (gender), significantly predicted the outcome in the first model (drinks per week; $R^2 = 0.05$, $F(3, 381) = 6.65$, $p < 0.025$). Although total ACEs did not significantly predict drinks per week ($\beta = 0.38$, $t(381) = 1.00$, $p = 0.32$), both female gender and higher mindfulness scores predicted lower drinks per week ($\beta = -4.89$, $t(381) = -3.20$, $p < 0.025$; $\beta = -0.089$, $t(381) = -2.72$, $p < 0.001$, respectively). This model revealed a nonsignificant direct effect of ACEs on drinks per week (Effect = 0.38, SE = 0.38, LLCI = −0.37, ULCI = 1.13) but a significant indirect effect of ACEs on drinks per week through levels of mindfulness (Effect = 0.15, Boot SE = 0.067, LLCI = 0.05, ULCI = 0.33). These results suggest evidence of mediation. For more information, see Table 4.

The second model examined the effect of ACEs total score and mindfulness on levels of alcohol related consequences. Results from this model suggest that ACEs significantly predicted the mediator, mindfulness ($R^2 = 0.02$, $F(2, 382) = 4.17$, $p < 0.025$; $\beta = -1.65$, $t(382) = -2.78$, $p < 0.025$). The full model including the predictor (ACEs), mediator (mindfulness), and covariate (gender) significantly predicted the outcome of alcohol-related consequences ($R^2 = 0.36$, $F(3, 381) = 18.40$, $p < 0.001$). Results indicate that higher ACE scores ($\beta = 0.53$, $t(381) = 3.22$, $p < 0.025$), male gender ($\beta = -1.81$, $t(381) = -2.78$, $p < 0.025$), and lower mindfulness scores ($\beta = -0.079$, $t(381) = -5.85$, $p < 0.001$) were associated with increased experience of alcohol-related consequences. Further, cumulative ACEs scores revealed both direct (Effect = 0.53, SE = 0.17, LLCI = 0.21, ULCI = 0.86) and indirect effects (Effect = 0.13, Boot SE = 0.046, LLCI = 0.051, ULCI = 0.24) on alcohol-related consequence. See Table 5 for full model results.

Additional mediation models were analyzed examining specific subscales of the FFMQ that were significantly correlated with our two outcomes of drinks per week and alcohol-related consequences (see Table 3). Three subscales (i.e., describe, act with awareness, and nonjudge facets) were examined as mediators between ACEs and the two identified outcome variables, resulting in an additional six mediational models. A Bonferroni correction of $p < 0.008$ (0.05/6) was applied to each additional analysis to control for family-wise alpha inflation. Results of these analyses suggest that although the describe facet of mindfulness significantly predicted fewer drinks per week ($\beta = -0.36$, $t(381) = -3.79$, $p < 0.001$) and alcohol-related consequences ($\beta = -0.20$, $t(381) = -4.79$, $p < 0.001$), it did not mediate the relation between either outcome (Effect = 0.11, Boot SE = 0.085, LLCI = −0.004, ULCI = 0.351; Effect = 0.063, Boot SE = 0.043, LLCI = −0.008, ULCI = 0.163, respectively). When examining the act with awareness subscale of the FFMQ as a mediator between the two outcome variables, these subscale scores significantly predicted fewer alcohol-related consequences ($\beta = -0.22$, $t(381) = -4.78$, $p < 0.001$), and demonstrated significant indirect effects on drinks per week (Effect = 0.14, Boot SE = 0.070, LLCI = 0.039, ULCI = 0.32) and

Table 3

Correlations of predictor, mediator, and outcome variables.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. ACES total score	1.00	0.058	0.185**	−0.129**	−0.018	0.047	−0.057	−0.163**	−0.173**
2. Drinks per week	–	1.00	0.520**	−0.154 **	−0.016	−0.073	−0.209	−0.135**	−0.007
3. Alcohol-related consequences	–	–	1.00	−0.291**	−0.077	−0.065	−0.253**	−0.250**	−0.214**
4. Facets of mindfulness total score	–	–	–	1.00	0.574**	0.372**	0.771**	0.720**	0.638**
5. Nonreact	–	–	–	–	1.00	0.379**	0.312**	0.164**	0.086
6. Observe	–	–	–	–	–	1.00	0.178**	−0.111*	−0.227**
7. Describe	–	–	–	–	–	–	1.00	0.450**	0.404**
8. Awareness	–	–	–	–	–	–	–	1.00	0.628**
9. Nonjudge	–	–	–	–	–	–	–	–	1.00

* Indicates statistical significance at $\alpha < 0.05$,

** Indicates statistical significance at $\alpha < 0.01$.

Table 4
Models examining mediating role of FFMQ on ACES and DPW.

Outcome: FFMQ (model summary)				
R	R^2	F	df1, df2	*p*
0.15	0.021	4.17	2, 382	0.016
	β	se	*t*	*p*
Constant	104.13	4.41	23.62	0.000
ACES Total Score	−1.65	0.59	−2.78	0.006
Gender	2.32	2.35	0.99	0.32

Outcome: DPW (model summary)				
R	R^2	F	df1, df2	*p*
0.22	0.05	6.65	3, 381	0.0002
	β	se	*t*	*p*
Constant	26.32	4.39	5.99	0.000
FFMQ	−0.089	0.033	−2.72	0.007
ACES total score	0.38	0.38	1.00	0.32
Gender	−4.80	1.50	−3.20	0.002

Direct effect of X on Y				
Effect	SE	*p*	LLCI	ULCI
0.38	0.38	0.32	−0.37	1.13

Indirect effect of X on Y				
	Effect	Boot SE	LLCI	ULCI
FFMQ	0.15	0.067	0.05	0.33

Table 5
Models examining mediating role of FFMQ on ACES and BYAACQ.

Outcome: FFMQ (model summary)				
R	R^2	F	df1, df2	*p*
0.15	0.021	4.17	2, 382	0.016
	β	se	*t*	*p*
Constant	104.13	4.41	23.62	0.000
ACES total score	−1.65	0.59	−2.78	0.006
Gender	2.32	2.35	0.99	0.32

Outcome: BYAACQ (model summary)				
R	R^2	F	df1, df2	*p*
0.36	0.13	18.40	3, 381	0.000
	β	se	*t*	*p*
Constant	17.67	1.91	9.24	0.000
FFMQ	−0.079	0.014	−5.58	0.000
ACES Total Score	0.53	0.17	3.22	0.001
Gender	−1.81	0.65	−2.78	0.006

Direct effect of X on Y				
Effect	SE	*p*	LLCI	ULCI
0.53	0.17	0.001	0.21	0.86

Indirect effect of X on Y				
	Effect	Boot SE	LLCI	ULCI
FFMQ	0.13	0.046	0.21	0.24

alcohol-related consequences (Effect = 0.13, Boot SE = 0.048, LLCI = 0.054, ULCI = 0.25). Finally, the nonjudge subscale predicted significantly fewer alcohol-related consequences ($\beta = 0.55$, t (381) = -2.82, $p < 0.001$) and mediated the relation between ACEs and alcohol-related consequences (Effect = 0.12, Boot SE = 0.048, LLCI = 0.041, ULCI = 0.23). This subscale did not demonstrate an indirect effect on drinks per week (Effect = -0.034, Boot SE = 0.081, LLCI = -0.22, ULCI = 0.12).

4. Discussion

This study is among the first to examine relations among ACEs, mindfulness, and health behaviors and the only research evaluating mindfulness as a mechanism for the impact of early adversity on alcohol use and consequences among college students. As predicted, mindfulness mediated the relations between early adversity and alcohol use and consequences. Specifically, decreased acting with awareness and nonjudgement may be particularly important for leading to greater use and consequences. Results suggest that lower levels of mindfulness may help explain how individuals who have experienced more adverse experiences are more likely to have increased alcohol intake and experienced more consequences related to their drinking.

Though prior research has supported the link between early adversity and a variety of mental and physical health outcomes, the mechanisms by which these outcomes occur are still largely unknown. The current study provides initial evidence that mindfulness mediates relations between early adverse experiences and alcohol outcomes. Consistent with previous literature, both acting with awareness and nonjudging aspects of mindfulness may be especially important for understanding how specific skill deficits may lead to increased alcohol consumption and experience of consequences (Karyadi & Cyders, 2015; Roos, Pearson, & Brown, 2015; Vinci, Spears, Peltier, & Copeland, 2016). Given the significance of acting with awareness as a mediator in both models, it is possible that students who display lower levels of mindfulness exhibit difficulties in self-monitoring while drinking, leading to increased drinking-related consequences. Further, perhaps students who are better able to avoid judging their own experiences are less likely to drink in ways that result in the experience of negative consequences. This research is the first to examine the role of mindfulness in contributing to increased drinking and experience of consequences among students with and without a history of early adverse experiences. Incorporating mindfulness skills into alcohol interventions may be useful for helping individuals to reduce experiences with alcohol-related consequences; this approach is especially promising given that mindfulness-based interventions for substance use, including alcohol, has demonstrated effectiveness (Chiesa & Serretti, 2014). In theory, such skills would make it easier for individuals to recognize the potential for negative drinking outcomes before they happen or resist cravings for alcohol when trying to stop or cut down on drinking (Bowen et al., 2009; Westbrook et al., 2013). Additionally, examining skills-based interventions that focus on acting with awareness and nonjudgement of thoughts and emotions may be particularly salient among this population.

There are several limitations to consider when interpreting these results. First, the current study used cross-sectional data, therefore causal inferences within the mediations cannot be confirmed. Future research should examine these relationships across time to replicate and strengthen these conclusions. The current study assessed eight specific experiences individuals may have encountered in childhood which may not necessarily reflect the full range or intensity of stressful events an individual might have experienced. Further, the majority of individuals reported experiencing no adverse events, with only 8.4% of the sample reporting four or more unique adverse experiences. Though this is not uncommon in a college student population (Anda, 2010; McGavock & Spratt, 2012), these results may not apply to a more high-risk sample. However, research has shown that even a few early adverse experiences

can lead to negative mental and physical health outcomes (Felitti et al., 1998; Schilling, Aseltine, & Gore, 2007). Also, all data were collected online via self-report measures. Though validity items were included to mitigate the chance of dishonest or inaccurate responding, there is the possibility that some participants were not truthful or accurate in their answers. Finally, since the current sample consisted primarily of Caucasian and female underclassmen, the results may not generalize to all college students or non-college individuals.

Students with a greater number of early adverse experiences were more likely to report lower levels of mindfulness, suggesting that experiencing early life stress may result in reduced ability to observe and describe thoughts and emotions without reacting to them. In particular, ACE scores were related to acting with awareness and nonjudge facets of mindfulness such that increased ACEs were associated with lower levels of both facets. Lower levels of mindfulness were associated with increased drinks per week and experience of alcohol-related consequences, with significant indirect effects for both models, demonstrating effects of early adversity through mindfulness on both outcomes. These results highlight a need for a greater understanding of the factors that contribute to associations between early adverse experiences and alcohol misuse and how interventions can be employed to mitigate negative outcomes. Integrating mindfulness-based skills into interventions for those who use alcohol and want to decrease consumption or related problems might be particularly useful for students who have experienced early adverse experiences in childhood; given that almost half of the current sample reported at least one adverse experience, targeted interventions among this population may be particularly useful. Future research should evaluate whether these findings persist using longitudinal data and establish whether promoting specific mindfulness skills among high-risk college students may be particularly helpful in reducing negative outcomes related to alcohol and other substance use.

Contributors

EB, HE, and TL conceptualized the study. EB and HE oversaw data collection. EB, HE, SL, and EL analyzed data and wrote the manuscript. All authors contributed to interpretation of results and revisions of the manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

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