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Examining Differences in Emotion Dysregulation Between Emerging Adult Alcohol-Only Users, Abstainers, and Simultaneous Users

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ABSTRACT

Objective: Simultaneous use of alcohol and cannabis is associated with more negative consequences than use of either substance alone. Research suggests that emotion dysregulation is linked to alcohol, cannabis, and polysubstance use. However, no previous research has examined whether emotion dysregulation scores differ among individuals without past month substance use (abstainers), individuals who report past-month alcohol use only (no past month cannabis or simultaneous use; alcohol-only users), and individuals who engage in past-month simultaneous alcohol and cannabis use (simultaneous users). Our aim was to examine differences in overall levels of emotion dysregulation and emotion dysregulation subscales between these groups. **Methods**: The sample included 468 college students. Participants completed an online survey assessing demographics, emotion dysregulation, average number of drinks per week, days of monthly cannabis use, and simultaneous use of alcohol and cannabis. **Results**: A one-way ANOVA showed significant differences in emotion dysregulation between alcohol-only users, abstainers, and simultaneous users. A Bonferroni post hoc analysis revealed significant differences in emotion dysregulation for simultaneous users ($p = .004$) compared to alcohol-only users and abstainers. A series of ANOVAs were run to examine emotion dysregulation subscale scores and significant differences were found for impulse control difficulties ($p = .003$) and limited access to emotion regulation strategies ($p = .005$) for simultaneous users compared to alcohol-only users and abstainers, and for non-acceptance of emotional responses ($p = .018$) for simultaneous users compared to and alcohol-only users. **Conclusion**: These findings indicate that simultaneous users have higher levels of emotion dysregulation, higher levels of impulse control difficulties, greater non-acceptance of emotions, and greater lack of access to emotion regulation strategies compared to abstainers and alcohol-only users.

Key words: = Alcohol; Cannabis; Emotion Dysregulation; Simultaneous Use; Impulsivity

Alcohol and cannabis are the most widely used substances on college campuses (Arria et al., 2008; White et al., 2019). A recent report by the Substance Abuse and Mental Health Services Administration (SAMHSA) reported that 18.8 million college-aged individuals currently use alcohol, while 11.8 million currently report using cannabis (SAMHSA, 2019). Notably, many college-aged alcohol and cannabis users report using both substances simultaneously (Subbaraman & Kerr, 2015). Simultaneous use is defined as using both substances during the same occasion so that their effects overlap and has been shown to be associated with greater negative consequences than using either substance alone (Yurasek et al., 2017), such as driving hazards

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(Terry-McElrath et al., 2014), poor academic performance (Arria et al., 2013), and accidental injuries (Hingson et al., 2009; White et al., 2019). Given the rise in rates of simultaneous use of alcohol and cannabis among this age group, there is a need to determine risk factors that contribute specifically to simultaneous use of alcohol and cannabis among college students.

Although difficulties in emotion regulation, or emotion dysregulation (Weiss et al., 2022), have been theorized to be linked to simultaneous use of alcohol and cannabis, research investigating this connection is scarce. Emotion regulation has been described as the awareness, identification, understanding, and acceptance of emotions, the ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and the ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses (Gratz & Roemer, 2004). The difficulty or inability to perform one or more of these tasks has been described as emotion dysregulation (Gratz & Roemer, 2004). While prior research has demonstrated associations between emotion dysregulation and alcohol use (for a review see Weiss et al., 2022) and cannabis use (Dorard & Bungener, 2008; Paulus et al., 2018), no previous studies have examined whether overall emotion dysregulation and specific emotion dysregulation subcomponents differ among college students who choose not to use alcohol or cannabis in the past month (abstainers), college students who drink alcohol but did not use cannabis or engage in simultaneous use in the past month (alcohol-only users), or college students who have engaged in simultaneous use of alcohol and cannabis in the past month (simultaneous users).

Positive and negative emotions have been shown to motivate substance-seeking behaviors. Previous research suggests that individuals who experience heightened negative affect may use alcohol and cannabis to alleviate strong negative or positive emotions (Weiss et al., 2015). This is consistent with negative reinforcement models of substance use, in which individuals use substances to escape or avoid their negative mood state, or regulate their emotions (Cooper et al., 1995). Moreover, drinking to regulate emotions has been linked to increased negative alcohol-related consequences (Dvorak et al., 2014). A recent review of emotion regulation and substance use disorders posits that individuals who have substance use disorders have greater emotion regulation difficulties than individuals without substance use disorders (Stellern et al., 2022). Conversely, recent ecological momentary assessment (EMA) research has shown that alcohol and cannabis use in this age group may be more closely linked with positive affect than negative affect (Dora et al., 2022). Although previous research has demonstrated positive mood increases shortly after drinking is initiated (Russell et al., 2020; Treloar et al., 2015), there is evidence showing that college students may use substances to dampen or downregulate positive emotions (Feldman et al., 2007; Weiss et al., 2019). Other research has suggested both positive and negative emotion regulation contribute to substance use. A review by Weiss et. al. (2022) showed that for negative emotion regulation abilities (i.e., regulating negative emotions), there were small-to-medium effect sizes for alcohol use (r = 0.23, p < 0.001) and for use of multiple substances (r = 0.25, p < 0.001). For positive emotion regulation abilities (i.e., regulating positive emotions), there were medium effect sizes for alcohol use (r = 0.24, p < 0.001) and drug use (r = 0.28, p < 0.001). Whether using substances in response to experiences of positive or negative affect, emotion regulation skills are crucial in responding appropriately to an emotion and behaving in accordance with desired goals. While the majority of published studies on this topic have examined the connection between emotion dysregulation and alcohol use, there is limited research connecting cannabis use to emotion dysregulation. Some evidence supports emotion dysregulation as a predictor of cannabis-related problems (Brook, 2016; Dvorak & Day, 2014; Manning et al., 2019), such that higher levels of cannabis-related problems (e.g., memory loss, procrastination, lower productivity at work or school) were associated with greater emotion dysregulation (Orr et al., 2020). Additionally, other research has shown emotion dysregulation being associated with the risk of more problematic cannabis use (Dvorak & Day, 2014). Overall, there is limited research examining how cannabis use may be associated with emotion dysregulation.

There is also a lack of research examining whether simultaneous use of alcohol and cannabis

is associated with greater levels of emotion dysregulation than alcohol use alone, as the existing research has examined emotion dysregulation in relation to polysubstance use broadly rather than simultaneous alcohol and cannabis use specifically. Notably, polysubstance use broadly refers to the use of multiple substances (Cicero et al., 2020), either simultaneously or at different times within a defined time period, whereas simultaneous use refers to the use of multiple substances together so that their effects overlap. A recent meta-analysis by Weiss et. al. (2022) highlights the importance of investigating the link between polysubstance use and emotion dysregulation. Their results indicated that the largest effect sizes exist for emotion dysregulation and polysubstance use, rather than alcohol or drug use alone. This may suggest that individuals who use multiple substances may experience greater emotion regulation difficulties than individuals who use these substances alone. Similarly, Crane and colleagues (2021) examined the frequency of alcohol, cannabis, and nicotine polysubstance use and associated risk factors in a sample of adolescents and found that greater symptoms of depression and anxiety along with weaker mood regulation expectancies were associated with increased polysubstance use over time (Crane et al., 2021). While this study showed that mood regulation expectancies were related to polysubstance use, it did not examine the simultaneous use of alcohol and cannabis or examine emotion dysregulation. Only one previous study examined the connection between emotion dysregulation and concurrent use of alcohol and cannabis (i.e., use of substances in the same time frame (month, day, etc.) but not use of them together at the same time (Bravo et al., 2021). Lucke and colleagues (2021) investigated the relationship between emotion dysregulation with individuals who concurrently use alcohol and cannabis. The authors found that while emotion dysregulation was not significantly associated with increased substance consumption, it was associated with an increase in substance-related consequences. Given the consequences associated with simultaneous use of alcohol and cannabis and the lack of research examining the connection between emotion dysregulation and simultaneous use of alcohol and cannabis, there is a need to examine simultaneous use of alcohol and cannabis in relation to emotion dysregulation.

While overall emotion dysregulation has been shown to be linked with alcohol and cannabis use, it remains unknown whether specific emotion dysregulation subcomponents are connected to simultaneous use of alcohol and cannabis. The most commonly used measure of emotion regulation difficulties is the Difficulties in Emotion Regulation Scale (DERS), which has six subscales based on four dimensions of emotion dysregulation. The six subscales measured by the DERS are 1. Nonacceptance of emotional responses, 2. Difficulty engaging in goal-directed behavior, 3. Impulse control difficulties, 4. Lack of emotional awareness, 5. Limited access to emotion regulation strategies, and 6. Lack of emotional clarity. To understand the connection between substance use and emotion dysregulation more clearly, it is important to dissect the subcomponents of emotion dysregulation and examine how these six components contribute to simultaneous use of alcohol and cannabis. Dvorak and colleagues (2014) included specific facets of emotion dysregulation in relation to alcohol use and found that difficulties with impulse control were associated with overall alcohol-use and alcohol-related consequences among college students. Additionally, they found that difficulties with goal directed behavior during negative mood, lack of emotional clarity, and non-acceptance of emotional responses were positively associated with frequency of alcohol-related consequences (Dvorak et al., 2014). In regard to cannabis, Bonn-Miller and colleagues (2008) found that non-acceptance of emotional responses was uniquely related to coping-oriented cannabis use. Relatedly, in their meta-analysis on emotion regulation and substance use among adults, Weiss et.al. (2022) found large effect sizes for impulse control difficulties and use of multiple substances (r = 0.38, p < 0.001), medium effect sizes for non-acceptance of emotional responses and use of multiple substances (r = 0.28, p < 0.001), and medium effect sizes for difficulties with goal-directed behavior and use of multiple substances (r = 0.25, p < 0.001). This suggests that specific facets of emotion dysregulation are linked to polysubstance use behaviors. However, no previous research has examined whether scores on facets of emotion dysregulation differ between

past month alcohol-only users, past month abstainers from alcohol and cannabis, and individuals who simultaneously used alcohol and cannabis in the past month.

In summary, previous research has established that individuals who use substances are at risk of experiencing difficulties in emotion regulation (Kenneson et al., 2013), and difficulties in emotion regulation have been associated with substance use (Weiss et al., 2022). However, little research has examined how the simultaneous use of alcohol and cannabis relate to emotion dysregulation, and whether emotion dysregulation scores or facets of emotion dysregulation differ between past month alcohol-only users, past month abstainers, and past month simultaneous users. Given the prevalence of simultaneous of alcohol and cannabis within the college student population, and that simultaneous use of these substances has been shown to be associated with significantly more problems than using each substance alone, research is needed to examine differences in emotion dysregulation specific to simultaneous users. Understanding the connection between simultaneous use of alcohol and cannabis and emotion dysregulation could aid in developing prevention and intervention techniques aimed at teaching emotion regulation skills and healthy coping mechanisms to college students in order to potentially reduce problems associated with simultaneous use of alcohol and cannabis. Thus, the primary goal of the current study was to examine the differences in overall emotion dysregulation among these groups and to examine differences on specific subscales of emotion dysregulation to better understand which subcomponents may be implicated in simultaneous alcohol and cannabis use. Based on previous research (Lucke et al., 2021; Weiss et al., 2022), it is hypothesized that simultaneous users would have higher emotion dysregulation scores than abstainers and alcohol-only users. Subscale differences were also explored but no a priori hypotheses were made regarding subscale differences.

METHODS

Participants

Participants were 468 undergraduate students (78.4% female, 21.2% male; 55.1% freshmen, 26.1% sophomore, 10.3% junior, 8.3% senior, .2% not currently enrolled) from a large public university in the southern United States. Participants averaged 19.38 (SD = 3.07) years of age (range: 18-46). Participants were 77.8% Caucasian, 8.8% African American, 2.6% Hispanic, 2.6% Asian, .4% American Indian or Alaska Native, and 7.9% Other or selected multiple races. Additionally, participants were 83.7% heterosexual (straight), 2.4% homosexual (gay), 8.5% bisexual, 3.2% other, and 1.5% preferred not to say.

Procedure

Prior to the start of the data collection, the protocol was reviewed and approved by the university's Institutional Review Board. All participants were provided informed consent materials which review the confidentiality of responses and their right to terminate participation at any time without penalty. Participants were eligible to participate if they were at least 18 years old. Individuals who consented to participate were asked to complete an online survey. Participants were recruited through an academic survey pool and were provided course credit for completion of the study.

Measures

Emotion Dysregulation. Emotion dysregulation was assessed using the Difficulties in Emotion Regulation Scale (DERS). The DERS is a 36-item self-report questionnaire that is commonly used to assess emotion dysregulation (Gratz & Roemer, 2004). It contains six subscales: 1. Nonacceptance of emotional responses (i.e., the tendency to have a negative secondary or non-accepting reaction to one's own distress; a sample item is "When I'm upset, I become angry with myself for feeling that way", this is referenced as "non-acceptance" throughout the manuscript), 2. Difficulty engaging in goal-directed behavior (i.e., the difficulty in concentrating and/or accomplishing tasks when experiencing negative emotions; a sample item is "When I'm upset, I have difficulty focusing on other things" this is referenced as "goals" throughout the manuscript),

3. Impulse control difficulties (i.e., the difficulty remaining in control of one's behavior when experiencing negative emotions; a sample item is "I experience my emotions as overwhelming and out of control" this is referenced as "impulse" throughout the manuscript), 4. Lack of emotional awareness (i.e., the lack of awareness or inattention to emotional responses; a sample item is "I pay attention to how I feel" this is referenced as "awareness" throughout the manuscript), 5. Limited access to emotion regulation strategies (i.e., the belief that there is little one can do to regulate oneself once upset; a sample item is "When I'm upset, I believe that I will remain that way for a long time" this is referenced as "strategies" throughout the manuscript), and 6. Lack of emotional clarity (i.e., the extent to which an individual knows and is clear about his or her emotions; a sample item is "I have no idea how I am feeling" this is referenced as "clarity" throughout the manuscript). For each question, participants rated their responses on a scale from 1 ("almost never") to 5 ("almost always") with questions 1, 2, 6, 7, 8,10, 17, 20, 22, 24, and 34 being reversed scored. A total score was computed by summing the 36 items. Total scores for each of the 6 subscales (non-acceptance, goals, impulse, awareness, strategies, and clarity) were also computed. The total DERS score and subscale scores are continuous variables where higher scores indicated more emotion dysregulation. This questionnaire has been shown to have a high internal consistency ($\alpha = 0.86$) and acceptable reliability ($r = 0.74$; Gratz & Roemer, 2004). Internal consistency for the current study was high ($\alpha = 0.95$). Additionally, internal consistencies for each subscale were high with Cronbach alpha scores of ($\alpha = 0.86$), ($\alpha = 0.89$), ($\alpha = 0.87$), ($\alpha = 0.86$), ($\alpha = 0.90$), ($\alpha = 0.80$) for non-acceptance, goals, impulse, awareness, strategies, and clarity respectively.

Alcohol Use. The Alcohol-only group was created using the Daily Drinking Questionnaire (DDQ). The DDQ assessed frequency of alcohol use in a typical week in the past month (Collins et al., 1985). For each day of the week, participants responded with the number of drinks consumed on that given day. A sample question is, "On a typical Friday, I have __ drinks." There are seven items which correspond to each day of the week, and a total score is summed to calculate total drinks per week. Previous research has demonstrated that the DDQ is highly correlated with other self-report measures of alcohol consumption (Kivlahan et al., 1990). Similarly, the DDQ has good test-retest validity (Neighbors et al., 2006) and criterion validity (Neighbors et al., 2004). If a participant had a total score of 1 or greater on the DDQ, indicated no past month cannabis use, and did not indicate past month simultaneous use of alcohol and cannabis, they were coded into the "alcohol-only users" group.

Simultaneous Use of Alcohol and Cannabis. Simultaneous alcohol and cannabis use were assessed with a single binary item from the Drug Use Questionnaire (DUQ). The DUQ is a self-report questionnaire that assesses past month illicit drug use and prescription drug use (Hien and First, 1991). The single item asked participants, "Have you used any of the following drugs with alcohol in the PAST MONTH? Marijuana (i.e., weed, pot, NOT including synthetic or analog forms/plant additives etc.)." Participants responded with either "yes" or "no", and responses were dichotomized to 1 = any simultaneous use in the past month, 2 = no simultaneous use in the past month. Previous research has assessed simultaneous use with a similar item (Patrick et al., 2018). The DUQ was also used to assess days of monthly cannabis use with the question "How many days in the PAST MONTH have you used the following drugs? Marijuana (i.e., weed, pot, NOT including synthetic or analog forms/plant additives etc.). Responses were 0-30 for days of monthly cannabis use. Participants who responded "yes" to using alcohol with cannabis were coded into the "simultaneous users" group, regardless of their answer on the DDQ or the DUQ for days of monthly cannabis use.

No Substance Use. The abstainer group was classified by individuals who reported "0" on the DDQ and those who reported no simultaneous use on the single measure of simultaneous use from the DUQ. Participants who scored a 0 on the DDQ, endorsed no past month cannabis use, and had a response of "no" for simultaneous use were coded into the "abstainers" group.

Data Analysis Plan

Analyses were conducted using SPSS version 26.0. All variables were checked for outliers, skewness, and kurtosis (Tabachnick et al., 2019). No outliers were identified. DERS and all of the DERS subscales (except for Goals) were positively skewed. Thus, we performed a square-root transformation for the DERS total score (skew = 1.45) and each skewed subscale; (Non-acceptance (skew = 1.79), Impulsivity (skew = 4.30), Awareness (skew = 0.38), Strategies (skew = 2.10), and Clarity (skew = 1.79)) to correct for the skew. After this transformation, the impulse control difficulties subscale was still positively skewed, so a log transformation was then performed to correct the skew further on the impulse control difficulties subscale (skew = 0.61). The data presented in the results represents the back-transformed values to help with interpretation of scores. Descriptive characteristics of the overall sample were conducted including demographic information as well as means and standard deviations of drinks per week for alcohol-only users. Means and standard deviations for drinks per week and days of monthly cannabis use were calculated for simultaneous users.

The primary study analysis examined whether there was a statistically significant difference between substance use groups on levels of emotion dysregulation. A one-way ANOVA was conducted to examine differences in emotion dysregulation between abstainers, alcohol-only users, and simultaneous users. A Bonferroni post hoc analysis was run due to the overall model being significant. Additionally, an exploratory series of ANOVAs with Bonferroni post-hoc tests were run to examine the differences between substance use groups on the emotion dysregulation subscales: 1. Nonacceptance of emotional responses, 2. Difficulty engaging in goal-directed behavior, 3. Impulse control difficulties, 4. Lack of emotional awareness, 5. Limited access to emotion regulation strategies, and 6. Lack of emotional clarity.

RESULTS

Descriptive Statistics

For simultaneous use of alcohol and cannabis, 16.45% of the sample (n = 77) reported using both substances simultaneously in the past month, while 22.22% of the sample (n = 104) reported using alcohol only in the past month, and 61.32% of the sample (n = 287) abstained from alcohol and cannabis use in the past month. Alcohol-only users reported an average of 8.01 (SD = 7.74) drinks per week, while simultaneous users reported an average of 11.29 (SD = 13.93) drinks per week and an average of 11.01 (SD = 9.67) days of monthly cannabis use. These results have been displayed in Table 1.

Analysis of Variance

A one-way ANOVA indicated there was a statistically significant difference in overall emotion dysregulation between simultaneous users, alcohol-only users, and abstainers ($F(2, 465) = 5.63$, $p = .004$, $\eta p2 = .024$). A Bonferroni post hoc analysis indicated the mean score on overall emotion dysregulation was greater for simultaneous users ($M = 98.27$, $SD = 26.07$) compared to abstainers ($M = 88.82$, $SD = 23.48$, $p = .006$) and alcohol-only users ($M = 87.42$, $SD = 22.75$, $p = .007$).

For the DERS subscales, a series of ANOVAs were conducted to examine if there were differences within the facets of emotion dysregulation among abstainers, alcohol-only users, and simultaneous users. Results revealed that impulse control difficulties were significantly different for simultaneous users than alcohol-only users or abstainers ($F(2, 465) = 5.95$, $p = .003$, $\eta p2 = .025$). Bonferroni post hoc analyses indicated that the mean score on the impulse control difficulties subscale was significantly greater among simultaneous users ($M = 14.34$, $SD = 5.67$) compared to alcohol-only users ($M = 11.87$, $SD = 4.44$), and abstainers ($M = 12.39$, $SD = 5.05$). Additionally, lack of emotion regulation strategies was significantly different for simultaneous users than alcohol-only users or abstainers ($F(2, 465) = 5.46$, $p = .005$, $\eta p2 = .023$). Bonferroni post hoc analyses indicated that the mean score on the limited access to emotion regulation strategies subscale were significantly greater among simultaneous users ($M = 21.73$, $SD = 8.29$) compared to alcohol-only users ($M = 18.31$, $SD = 7.03$), and abstainers ($M = 18.82$, $SD = 7.44$). Further, non-acceptance of emotional responses was significantly different for simultaneous users and alcohol-only users ($F(2, 465) = 4.39$, $p = .013$,

ηp2 = .019). Bonferroni post hoc analyses indicated that the mean score on non-acceptance of emotional responses were significantly greater among simultaneous users (M = 16.56, SD = 6.41) than alcohol-only users (M = 13.99, SD = 5.05), but not abstainers (M = 14.92, SD = 5.87). Effect sizes are displayed in Table 1. There were no other significant differences between abstainers,

Table 1. *Descriptive Statistics for Demographics and Outcome Variables*

	Total Sample (N = 468)	Abstainers (N = 287)	Alcohol-Only Users (N = 104)	Simultaneous Users (N = 77)	χ^2	Sig.	
Gender					χ^2 (2) = 2.84	p = .24	
Male	n = 99 (21.2%)	n = 68 (23.8%)	n = 18 (17.3%)	n = 13 (17.1%)			
Female	n = 367 (78.4%)	n = 218 (76.2%)	n = 86 (82.7%)	n = 63 (82.9%)			
Ethnicity					χ^2 (2) = 7.80	p = .02	
White	n = 364 (77.8%)	n = 213 (74.2%)	n = 91 (87.5%)	n = 60 (77.9%)			
Non-White	n = 104 (22.2%)	n = 74 (25.8%)	n = 13 (12.5%)	n = 17 (22.1%)			
Sexual Orientation					χ^2 (2) = 5.27	p = .07	
Heterosexual	n = 392 (83.7%)	n = 243 (84.7%)	n = 91 (87.5%)	n = 58 (75.3%)			
Non-Heterosexual	n = 76 (16.2%)	n = 44 (15.0%)	n = 13 (12.5%)	n = 19 (24.7%)			
	M (SD)	M (SD)	M (SD)	M (SD)	Statistical Test F	Sig. p	η_p^2
Age	19.38 (3.07)	19.17 (2.63)	19.95 (4.18)	19.42 (2.75)			
Total Drinks Per Week	3.63 (8.16)	0.00 (0.00)	8.01 (7.74)	11.30 (13.93)			
Daily Cannabis Use	1.82 (5.65)	0.00 (0.00)	0.00 (0.00)	11.01 (9.67)			
DERS total	90.07 (24.00)	89.62 (23.81)	89.37 (22.13)	98.27 (26.07)	5.63	.004*	.024
DERS Non-acceptance	14.98 (5.84)	14.92 (5.87)	13.99 (5.05)	16.56 (6.41)	4.39	.013*	.019
DERS Goals	16.07 (4.91)	15.75 (4.87)	16.13 (4.73)	17.21 (5.17)	2.69	.069	.011
DERS Impulse	12.59 (5.09)	12.39 (5.05)	11.87 (4.44)	14.34 (5.67)	5.95	.003*	.025
DERS Awareness	14.99 (4.98)	14.90 (4.77)	14.87 (4.94)	15.45 (5.75)	.410	.664	.002
DERS Strategies	19.19 (7.57)	18.82 (7.44)	18.31 (7.03)	21.73 (8.29)	5.46	.005*	.023
DERS Clarity	12.24 (3.75)	12.04 (3.78)	12.25 (3.36)	12.99 (4.07)	1.95	.143	.008

Note. * p <.05 with Bonferroni Correction; DERS = Difficulties in Emotion Regulation Scale; "Non-acceptance" is the "Non-acceptance of emotional responses" subscale for the Difficulties in Emotion Regulation Scale, "Goals" is the "Difficulty engaging in goal-directed behavior" subscale for the Difficulties in Emotion Regulation Scale, "Impulse" is the "Impulse control difficulties" subscale for the Difficulties in Emotion Regulation Scale, "Awareness" is the "Lack of emotional awareness" subscale for the Difficulties in Emotion Regulation Scale, "Strategies" is the "Limited access to emotion regulation strategies" subscale for the Difficulties in Emotion Regulation Scale, and "Clarity" is the "Lack of emotional clarity" subscale for the Difficulties in Emotion Regulation Scale.

alcohol-only users, and simultaneous users on the other subscales of emotion dysregulation.

DISCUSSION

Alcohol and cannabis are the most widely used substances among college students, and simultaneous use of these substances increases the risk for harmful consequences. The purpose of the present study was to examine differences in overall emotion dysregulation and facets of

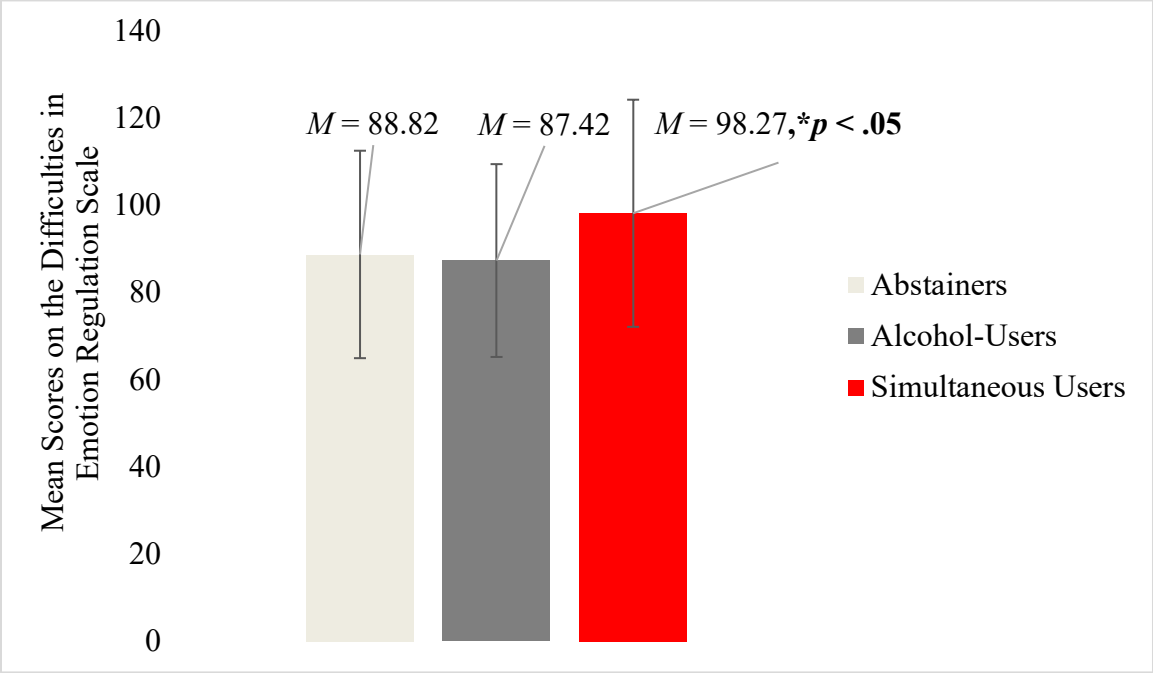
emotion dysregulation among individuals who only used alcohol in the past month (alcohol-only users), those who abstained from alcohol and cannabis in the past month (abstainers), and those who have used alcohol and cannabis simultaneously in the past month (simultaneous users). Our results suggest that simultaneous users endorsed significantly greater overall emotion dysregulation than alcohol-only users and abstainers. In addition, simultaneous users reported significantly greater impulse control difficulties, non-acceptance of emotional responses, and limited access to emotion regulation strategies than alcohol-only users and abstainers.

Based on the findings from the Weiss and colleagues' (2022) meta-analysis showing polysubstance users may experience more emotion dysregulation, we hypothesized that simultaneous users would report more emotion dysregulation than alcohol-only users and abstainers. This hypothesis was supported and is consistent with previous research examining emotion dysregulation with concurrent use of alcohol and cannabis (Lucke et al., 2021). However, further research is needed to better understand exactly why simultaneous use of alcohol and cannabis is associated with greater emotion dysregulation. Though speculative, it has been theorized that individuals experiencing greater emotion regulation difficulties may use multiple substances to help regulate their emotional experiences. Individuals who have difficulty regulating their emotions may experience heightened psychological or interpersonal distress and may use multiple substances in an attempt to manage this distress (Weiss et al., 2022). Additionally, it is also possible that the differences in emotion dysregulation scores found in the present sample were a result of a heavier drinking pattern among those in the simultaneous use group. As shown in Table 1, participants in the alcohol-only group reported and average of 8.01 drinks per week (SD = 7.74) versus 11.30 drinks per week (SD = 13.93) in the simultaneous use group, suggesting this group displays a different pattern of alcohol consumption than the other two groups. Though it is not possible to test this research question with the current data, it is possible that this group's pattern of heavier drinking is contributing to the differences in emotion dysregulation rather than their simultaneous use of alcohol and cannabis. This is an important research question that should be tested in future work on emotion dysregulation and simultaneous use of alcohol and cannabis.

Given the prevalence of co-use of alcohol and cannabis within the college student population, future research should further examine the underlying mechanisms connecting emotion dysregulation with simultaneous use of alcohol and cannabis. Understanding these mechanisms could aid in developing prevention and intervention techniques aimed at teaching emotion regulation skills and healthy coping mechanisms to college students who use multiple substances. Interventions that specifically target emotion regulation difficulties have been shown to be beneficial in treatment of a variety of mental health disorders, including substance use disorders (Gratz et al., 2015). A recent meta-analysis exploring interventions targeting emotion regulation among individuals with depression and anxiety showed that both a reduction in disengagement emotion regulation skills (avoidance, suppression, and rumination) and an increase in engagement emotion regulation skills (acceptance, cognitive reappraisal, and problem solving) reduced depression and anxiety (Daros et al., 2021). It is possible that teaching emotion regulation skills to college-aged individuals who engage in simultaneous use of substances may improve emotion dysregulation and impact substance use outcomes. Additionally, previous work has shown that teaching dialectical behavior therapy (DBT) skills can lead to improved alcohol use outcomes among individuals with substance use disorders (Cavicchioli et al., 2019). Research is needed to determine whether teaching DBT skills to college student substance users would result in improved substance use outcomes in this population. Brief interventions incorporating emotion regulation skills may be especially useful for college students who are using alcohol and cannabis simultaneously. Moreover, prevention efforts using psychoeducation with college students on the connection between emotion dysregulation and consequences of simultaneous use may be beneficial.

In the current study, simultaneous users reported greater impulse control difficulties than alcohol-only users or abstainers. This finding is consistent with previous research demonstrating that co-use of alcohol and cannabis is linked with impulse control difficulties (Daros et al., 2022; Trull et al., 2016; Waddell et al., 2021). Using ecological momentary assessment to measure impulsivity, affect, and substance use over the course of a month, Trull and colleagues (2016) found both alcohol and cannabis were independently associated with increased impulsivity scores when individuals used both alcohol and cannabis on the same day. Additionally, previous research has shown that individuals with higher levels of impulsivity may be drinking more on days when they co-use alcohol and cannabis, relative to those lower in impulsivity who drink less (Waddell et al., 2021). Furthermore, Daros and colleagues (2022) explored the moderating role of several components of impulsivity on the associations of cannabis and alcohol use and found that negative negative urgency and delay discounting factors of impulsivity play a role in co-use of alcohol and cannabis. The authors suggest that for individuals scoring high on negative urgency, they may be combining large amounts of alcohol and cannabis to experience relief from negative emotional experiences. Thus, it is evident that impulse control difficulties may contribute to simultaneous use of alcohol and cannabis and interventions targeting impulsivity and emotion regulation may be beneficial to college students engaging in simultaneous use of alcohol and cannabis.

Figure 1. *Bar Graph of Mean Scores for the Difficulties in Emotion Regulation Scale*

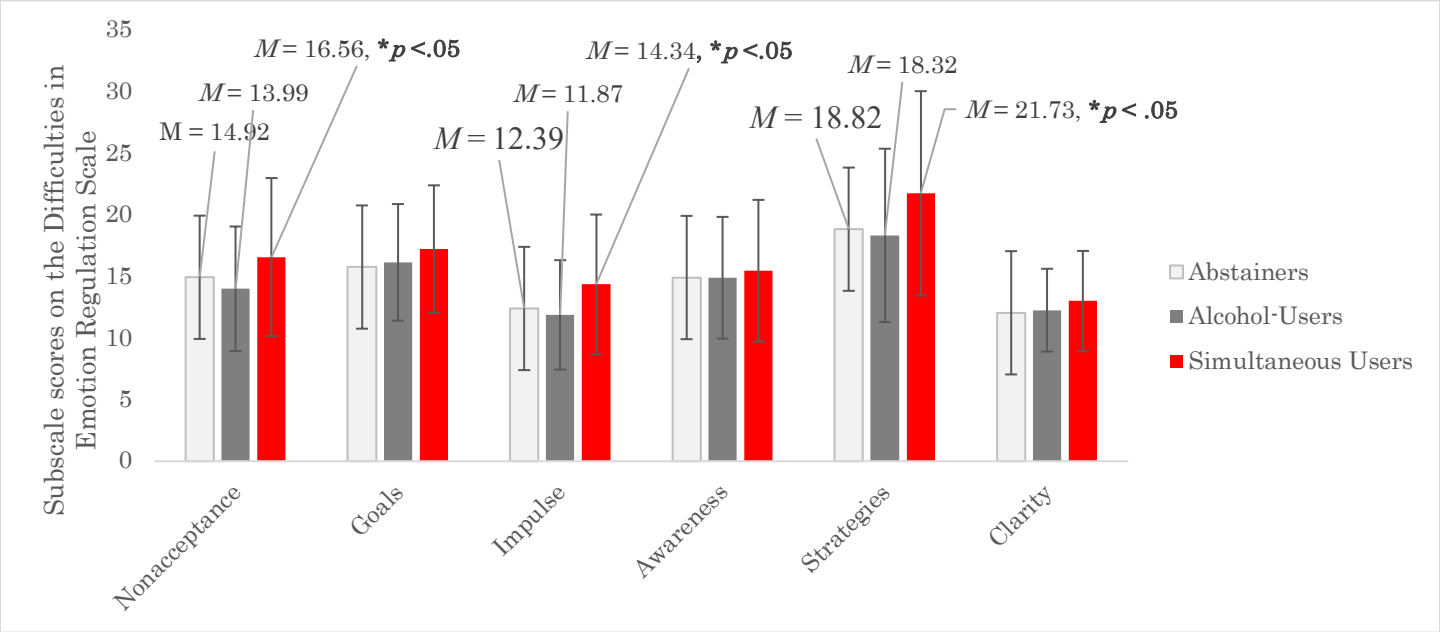


Note. * $p < .05$; Error bars are Standard Deviations.

Another facet of emotion dysregulation related to substance use may be the non-acceptance of emotional responses, meaning that simultaneous users may be having difficulty accepting their emotions compared to alcohol-only users. This finding is consistent with previous research demonstrating that non-acceptance of emotional responses was associated with alcohol-related consequences (Dvorak et al., 2014) and coping-oriented cannabis use (Bonn-Miller et al., 2008). Further, Weiss and colleagues (2022) demonstrated medium-effect sizes between non-acceptance of emotional responses to use of multiple substances. Thus, this study extends Weiss and colleagues (2022) to demonstrate how the emotional dysregulation subscales differ between past month simultaneous users, alcohol-only users, and abstainers. Previous research has also found an association between impulse control difficulties and

the non-acceptance of emotional responses predicting problematic alcohol use, suggesting that these two facets of emotion dysregulation may be interrelated (Miller and Racine, 2022). At least one previous intervention has been developed to target impulse control difficulties among substance users. Hall and colleagues (2021) examined the efficacy of an intervention for emotion regulation and impulse control (ERIC) in a sample of seventy-nine young adults with substance use comorbidities. Following the 12-week intervention, there were significant reductions in severe emotion dysregulation and

Figure 2. *Bar Graph of Mean Scores of Subscales for the Difficulties in Emotion Regulation Scale*



Note. * $p < .05$ with Bonferroni correction; Error bars are Standard Deviations; "Nonacceptance" is the "Nonacceptance of emotional responses" subscale for the Difficulties in Emotion Regulation Scale, "Goals" is the "Difficulty engaging in goal-directed behavior" subscale for the Difficulties in Emotion Regulation Scale, "Impulse" is the "Impulse control difficulties" subscale for the Difficulties in Emotion Regulation Scale, "Awareness" is the "Lack of emotional awareness" subscale for the Difficulties in Emotion Regulation Scale, "Strategies" is the "Limited access to emotion regulation strategies" subscale for the Difficulties in Emotion Regulation Scale, and "Clarity" is the "Lack of emotional clarity" subscale for the Difficulties in Emotion Regulation Scale.

psychological distress symptoms improved. Future research is needed to determine if this intervention results in reductions in substance use. Additionally, an intervention targeting impulsive personality traits in high school cannabis users showed success in delaying cannabis use onset among youth high in sensation seeking (Mahu et al., 2015). However, no previous interventions have directly targeted impulse control difficulties and measured whether improvements in impulse control result in decreased simultaneous use among college students. Development and testing of a brief intervention designed to improve impulse related difficulties, increase acceptance of emotions, and reduce substance use in this population would be worthwhile in future research.

In addition to greater impulse control difficulties, the present study has shown that simultaneous users may be experiencing greater problems accessing effective emotion regulation skills compared to abstainers and alcohol-only users. Although this finding has not been demonstrated in previous research focusing on simultaneous use of alcohol and cannabis, previous research has speculated that people who may have limited access to emotion regulation strategies may be using multiple substances to modulate emotional experiences (Weiss et al., 2022). Previous research has shown that among individuals with alcohol use disorder, limited access to emotion regulation strategies mediated the association of positive urgency and binge drinking (Pepe et al., 2022). This suggests that

among individuals with alcohol use disorder, both impulsive traits and lack of access to emotion regulation strategies may be risk factors for binge drinking. Further, Pepping and colleagues (2014) found a negative indirect effect of mindfulness and psychosocial distress through lack of access to emotion regulation strategies. The authors suggest that individuals low in mindfulness have trouble adaptively reacting to distressing emotions, which impacts their psychosocial functioning. Although this study did not examine substance use, individuals who use alcohol and lack to effective regulation strategies may engage in substance use to help control their emotions. This is consistent with previous research that found that negative affect intensity had an indirect effect on drinking to cope through individuals having limited access to emotion regulation strategies (Veilleux et al., 2014). This suggests that learning more emotion-regulation strategies may be beneficial for those who are prone to use substances in response to emotion dysregulation. Future research could examine whether teaching mindfulness-based emotion regulation strategies to simultaneous substance users would lead to improvements in access to effective emotion regulation strategies and whether such improvements would lead to decreases in incidences of simultaneous use of alcohol and cannabis.

Limitations

The results of the current study should be considered in light of its limitations. The limitations include that the sample was limited to college students (the majority of whom were white and female), which limits generalizability of these findings to the college student population as a whole. Future research on this topic with a more diverse sample is warranted. Additionally, all data were collected via self-report and may have been subject to individual biases. However, previous research within this population has shown that self-report drinking behaviors are reliable, due to the nature of the information remaining anonymous (Del Boca & Darkes, 2003). Moreover, because this was a cross-sectional study, causal relations among variables cannot be observed. Longitudinal research examining individual change in emotion regulation over time and substance use behaviors is necessary to determine whether emotion dysregulation and impulsivity leads to increased simultaneous use or whether increased substance use leads to increased emotion dysregulation and impulsivity. Additionally, the present study used one-way ANOVA analyses to address differences in emotion dysregulation across differing groups of substance users and provides a surface-level examination of this relationship. An unsupervised machine learning approach could be employed in future research to develop profiles of the DERS and examine how these profiles relate to alcohol use and simultaneous use of alcohol and cannabis. Furthermore, our simultaneous use variable focused generally on if the individual used alcohol and cannabis together in the past month. Although past research has used a similar assessment of simultaneous use (Patrick et al., 2018), using a binary outcome limits our ability to understand frequency and severity of simultaneous use or consequences associated with simultaneous use. Future research should examine how emotion dysregulation relates to severity, frequency, and consequences associated with simultaneous use of alcohol and cannabis to fully understand how emotion dysregulation may be contributing to simultaneous use of alcohol and cannabis. Ecological momentary assessment (EMA) could also be used to examine daily or moment-to-moment relations between emotion dysregulation and frequency, quantity, and consequences of simultaneous use of alcohol and cannabis. Finally, due to the relatively small number of students in our sample endorsing use of cannabis-only in the past month (without past-month use of alcohol or simultaneous use; $n = 30$), the current study could not examine differences in emotion dysregulation for those who used only cannabis in the past month. It would be interesting in future research to see if this group differs on overall emotion dysregulation and emotion dysregulation facets when compared to alcohol-only users, simultaneous users, and abstainers.

Strengths and Implications

Despite these limitations, this study has significant public health relevance as it identifies emotion dysregulation and facets of emotion dysregulation as potential contributors to the simultaneous use of alcohol and cannabis in a large sample of college students. The current study has supported that difficulties regulating emotions, and

more specifically, deficits in impulse control, acceptance of emotions, and emotion regulation strategies, were linked to simultaneous use of alcohol and cannabis. Thus, it may be helpful to emphasize these constructs when choosing therapy, intervention, and educational approaches for college students experiencing problems stemming from simultaneous use of alcohol and cannabis. Therapeutic, intervention, and educational efforts aimed at improving overall emotion dysregulation, impulse control, and acceptance of emotions, as well as teaching strategies for coping with strong emotions, may be especially helpful for this population.

Conclusions

In conclusion, the present findings complement and extend previous research exploring the link between emotion dysregulation and simultaneous use of alcohol and cannabis. Specifically, the present findings suggest that individuals who are simultaneously using alcohol and cannabis have more difficulties regulating their emotions. Particularly, non-acceptance of emotional responses, impulse control difficulties, and limited access to emotion regulation skills may be especially relevant among college students who use alcohol and cannabis simultaneously. Future work should directly examine whether increasing access to emotion regulation strategies and targeting non-acceptance of emotions and impulse control difficulties in college student populations would lead to decreases in simultaneous use of alcohol and cannabis and associated consequences.

REFERENCES

Arria, A. M., Caldeira, K. M., O'Grady, K. E., Vincent, K. B., Fitzelle, D. B., Johnson, E. P., & Wish, E. D. (2008). Drug exposure opportunities and use patterns among college students: Results of a longitudinal prospective cohort study. *Substance Abuse Official Publication of the Association for Medical Education and Research in Substance Abuse*, *29*(4), 19–38.

Arria, A. M., Garnier-Dykstra, L. M., Caldeira, K. M., Vincent, K. B., Winick, E. R., & O'Grady, K. E. (2013). Drug use patterns and continuous enrollment in college: Results from a longitudinal study. *Journal of Studies on Alcohol and Drugs*, *74*(1), 71–83.

Bonn-Miller, M. O., Vujanovic, A. A., & Zvolensky, M. J. (2008). Emotional dysregulation: Association with coping-oriented marijuana use motives among current marijuana users. *Substance Use & Misuse*, *43*(11), 1656–1665. https://doi.org/10.1080/10826080802241292

Bravo, A. J., Prince, M. A., Pilatti, A., Mezquita, L., Keough, M. T., & Hogarth, L. (2021). Young adult concurrent use and simultaneous use of alcohol and marijuana: A cross-national examination among college students in seven countries. *Addictive Behaviors Reports*, *14*, 100373. https://doi.org/10.1016/j.abrep.2021.100373

Brook, J. S. (2016). Marijuana use from adolescence to adulthood: Developmental trajectories and their outcomes. *Social Psychiatry and Psychiatric Epidemiology*, 11.

Cavicchioli, M., Movalli, M., Vassena, G., Ramella, P., Prudenziati, F., & Maffei, C. (2019). The therapeutic role of emotion regulation and coping strategies during a stand-alone DBT skills training program for alcohol use disorder and concurrent substance use disorders. *Addictive Behaviors*, *98*, 106035. https://doi.org/10.1016/j.addbeh.2019.106035

Cicero, T. J., Ellis, M. S., & Kasper, Z. A. (2020). Polysubstance use: A broader understanding of substance use during the opioid crisis. *American Journal of Public Health*, *110*(2), 244–250. https://doi.org/10.2105/AJPH.2019.305412

Collins, R. L., Parks, G. A., & Marlatt, G. A. (1985). Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*, *53*(2), 189–200. https://doi.org/10.1037/0022-006X.53.2.189

Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology*, *69*(5), 990–1005. https://doi.org/10.1037/0022-3514.69.5.990

Crane, N. A., Langenecker, S. A., & Mermelstein, R. J. (2021). Risk factors for alcohol, marijuana, and cigarette polysubstance use

during adolescence and young adulthood: A 7-year longitudinal study of youth at high risk for smoking escalation. *Addictive Behaviors*, *119*, 106944. https://doi.org/10.1016/j.addbeh.2021.106944

Daros, A. R., Haefner, S. A., Asadi, S., Kazi, S., Rodak, T., & Quilty, L. C. (2021). A meta-analysis of emotional regulation outcomes in psychological interventions for youth with depression and anxiety. *Nature Human Behaviour*, *5*(10), 1443–1457. https://doi.org/10.1038/s41562-021-01191-9

Daros, A. R., Pereira, B. J., Khan, D., Ruocco, A. C., Quilty, L. C., & Wardell, J. D. (2022). Daily associations between cannabis use and alcohol use in young adults: The moderating role of self-report and behavioral measures of impulsivity. *Addiction Research & Theory*, *30*(2), 79–88. https://doi.org/10.1080/16066359.2021.1939314

Del Boca, F. K., & Darkes, J. (2003). The validity of self-reports of alcohol consumption: State of the science and challenges for research. *Addiction*, *98*(s2), 1–12. https://doi.org/10.1046/j.1359-6357.2003.00586.x

Dora, J., Piccirillo, M., Foster, K. T., Arbeau, K., Armeli, S., Auriacombe, M., Bartholow, B. D., Beltz, A. M., Blumenstock, S. M., Bold, K. W., Bonar, E. E., Braitman, A. L., Carpenter, R. W., Creswell, K. G., De Hart, T., Dvorak, R. D., Emery, N. N., Enkema, M., Fairbairn, C., … King, K. M. (2022). The daily association between affect and alcohol use: A meta-analysis of individual participant data. https://doi.org/10.31234/osf.io/xevct

Dorard, G., & Bungener, C. (2008). Affect dysregulation in cannabis abusers: A study in adolescents and young adults. *Adolescent Psychiatry*, *17*(5), 9.

Dvorak, R. D., & Day, A. M. (2014). Marijuana and self-regulation: Examining likelihood and intensity of use and problems. *Addictive Behaviors*, *39*(3), 709–712. https://doi.org/10.1016/j.addbeh.2013.11.001

Dvorak, R. D., Sargent, E. M., Kilwein, T. M., Stevenson, B. L., Kuvaas, N. J., & Williams, T. J. (2014). Alcohol use and alcohol-related consequences: Associations with emotion regulation difficulties. *American Journal of Drug & Alcohol Abuse*, *40*(2), 125–130. https://doi.org/10.3109/00952990.2013.877920

Feldman, G. C., Joormann, J., & Johnson, S. L. (2007). Responses to positive affect: A self-report measure of rumination and dampening. *Cognitive Therapy and Research*, *32*(4), 507. https://doi.org/10.1007/s10608-006-9083-0

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, 14.

Gratz, K. L., Weiss, N. H., & Tull, M. T. (2015). Examining emotion regulation as an outcome, mechanism, or target of psychological treatments. *Current Opinion in Psychology*, *3*, 85–90. https://doi.org/10.1016/j.copsyc.2015.02.010

Hall, K., Youssef, G., Simpson, A., Sloan, E., Graeme, L., Perry, N., Moulding, R., Baker, A. L., Beck, A. K., & Staiger, P. K. (2021). An emotion regulation and impulse control (ERIC) intervention for vulnerable young people: A multi-sectoral pilot study. *Frontiers in Psychology*, *12*. https://www.frontiersin.org/articles/ 10.3389/fpsyg.2021.554100

Hien, D. A., & First, M. (1991). Drug use questionnaire. *Unpublished Scale, Columbia College of Physicians and Surgeons, New York State Psychiatric Institute*.

Hingson, R. W., Zha, W., & Weitzman, E. R. (2009). Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18-24, 1998-2005. *Journal of Studies on Alcohol and Drugs. Supplement*, *16*, 12–20. https://doi.org/10.15288/ jsads.2009.s16.12

Kenneson, A., Funderburk, J. S., & Maisto, S. A. (2013). Substance use disorders increase the odds of subsequent mood disorders. *Drug and Alcohol Dependence*, *133*(2), 338–343. https://doi.org/10.1016/j.drugalcdep.2013.06.011

Kivlahan, D., Marlatt, G. A., Fromme, K., Coppel, D. B., & Williams, E. (1990). *Secondary prevention of alcohol-related problems in young adults at risk.* (K. D. Craig & S. M. Weiss, Eds.). Springer Publishing Company.

Lucke, H. R., Harbke, C. R., Mathes, E. W., & Hammersley, J. J. (2021). Higher emotion dysregulation and coping motives in alcohol

and marijuana users. *Substance Use & Misuse*, *56*(7), 950–961. https://doi.org/10.1080/10826084.2021.1901927

Mahu, I. T., Doucet, C., O'Leary-Barrett, M., & Conrod, P. J. (2015). Can cannabis use be prevented by targeting personality risk in schools? Twenty-four-month outcome of the adventure trial on cannabis use: A cluster-randomized controlled trial. *Addiction*, *110*(10), 1625–1633. https://doi.org/10.1111/add.12991

Manning, K., Garey, L., Paulus, D. J., Buckner, J. D., Hogan, J. B. D., Schmidt, N. B., & Zvolensky, M. J. (2019). Typology of cannabis use among adults: A latent class approach to risk and protective factors. *Addictive Behaviors, 92*, 6–13. https://doi.org/10.1016/j.addbeh.2018.12.008

Miller, A. E., & Racine, S. E. (2022). Emotion regulation difficulties as common and unique predictors of impulsive behaviors in university students. *Journal of American College Health*, *70*(5), 1387–1395. https://doi.org/10.1080/07448481.2020.1799804

Neighbors, C., Dillard, A. J., Lewis, M. A., Bergstrom, R. K., & Neil, T. A. (2006). Normative misperceptions and temporal precedence of perceived norms and drinking. *Journal of Studies on Alcohol*, *67*(2), 290–299.

Neighbors, C., Larimer, M. E., & Lewis, M. A. (2004). Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. *Journal of Consulting and Clinical Psychology*, *72*(3), 434–447. https://doi.org/10.1037/0022-006X.72.3.434

Orr, M. F., Rogers, A. H., Shepherd, J. M., Buckner, J. D., Ditre, J. W., Bakhshaie, J., & Zvolensky, M. J. (2020). Is there a relationship between cannabis use problems, emotion dysregulation, and mental health problems among adults with chronic pain? *Psychology, Health & Medicine*, *25*(6), 742–755. https://doi.org/10.1080/13548506.2019.1653485

Patrick, M. E., Kloska, D. D., Terry-McElrath, Y. M., Lee, C. M., O'Malley, P. M., & Johnston, L. D. (2018). Patterns of simultaneous and concurrent alcohol and marijuana use among adolescents. *The American Journal of Drug and Alcohol Abuse*, *44*(4), 441–451. https://doi.org/10.1080/00952990.2017.1402335

Paulus, D. J., Hogan, J. B. D., & Zvolensky, M. J. (2018). Examining emotion dysregulation as an underlying factor explaining relations of anxiety sensitivity and cannabis use severity. *Translational Issues in Psychological Science*, *4*(1), 21–32. https://doi.org/10.1037/tps0000143

Pepe, M., Di Nicola, M., Moccia, L., Franza, R., Chieffo, D., Addolorato, G., Janiri, L., & Sani, G. (2022). Limited access to emotion regulation strategies mediates the association between positive urgency and sustained binge drinking in patients with alcohol use disorder. *International Journal of Mental Health and Addiction*. https://doi.org/10.1007/s11469-022-00807-z

Pepping, C. A., O'donovan, A., Zimmer-gembeck, M. J., & Hanisch, M. (2014). Is emotion regulation the process underlying the relationship between low mindfulness and psychosocial distress? *Australian Journal of Psychology*, *66*(2), 130–138. https://doi.org/10.1111/ ajpy.12050

Russell, M. A., Linden-Carmichael, A. N., Lanza, S. T., Fair, E. V., Sher, K. J., & Piasecki, T. M. (2020). Affect relative to day-level drinking initiation: Analyzing ecological momentary assessment data with multilevel spline modeling. *Psychology of Addictive Behaviors :*, *34*(3), 434. https://doi.org/10.1037/adb0000550

Stellern, J., Xiao, K. B., Grennell, E., Sanches, M., Gowin, J. L., & Sloan, M. E. (2022). Emotion regulation in substance use disorders: A systematic review and meta-analysis. *Addiction*, *n/a*(n/a). https://doi.org/10.1111/add.16001

Subbaraman, M. S., & Kerr, W. C. (2015). Simultaneous vs. concurrent use of alcohol and cannabis in the national alcohol survey. *Alcoholism, Clinical and Experimental Research*, *39*(5), 872–879. https://doi.org/10.1111/acer.12698

Substance Abuse and Mental Health Services Administration. (2019). *Key Substance Use and Mental Health Indicators in the United States: Results from the 2018 National Survey on Drug Use and Health*. 82.

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2019). *Using multivariate statistics* (Seventh edition). Pearson.

Terry-McElrath, Y. M., O'Malley, P. M., & Johnston, L. D. (2014). Alcohol and marijuana use patterns associated with unsafe driving among U.S. high school seniors: High use frequency, concurrent use, and simultaneous use. *Journal of Studies on Alcohol and Drugs*, *75*(3), 378–389. https://doi.org/10.15288/jsad.2014.75.378

Treloar, H., Piasecki, T. M., McCarthy, D. M., Sher, K. J., & Heath, A. C. (2015). Ecological evidence that affect and perceptions of drink effects depend on alcohol expectancies. *Addiction*, *110*(9), 1432–1442. https://doi.org/10.1111/ add.12982

Trull, T. J., Wycoff, A. M., Lane, S. P., Carpenter, R. W., & Brown, W. C. (2016). Cannabis and alcohol use, affect and impulsivity in psychiatric out-patients' daily lives. *Addiction*, *111*(11), 2052–2059. https://doi.org/10.1111/ add.13471

Veilleux, J. C., Skinner, K. D., Reese, E. D., & Shaver, J. A. (2014). Negative affect intensity influences drinking to cope through facets of emotion dysregulation. *Personality and Individual Differences, 59, 96-101.* https://doi.org/10.1016/j.paid.2013.11.012

Waddell, J. T., Gunn, R. L., Corbin, W. R., Borsari, B., & Metrik, J. (2021). Drinking less on cannabis use days: The moderating role of UPPS-P impulsive personality traits. *Psychology of Addictive Behaviors*, *35*(6), 737–748. https://doi.org/10.1037/adb0000727

Weiss, N. H., Kiefer, R., Goncharenko, S., Raudales, A. M., Forkus, S. R., Schick, M. R., & Contractor, A. A. (2022a). Emotion regulation and substance use: A meta-analysis. *Drug and Alcohol Dependence*, *230*, 109131. https://doi.org/10.1016/j.drugalcdep.2021.109131

Weiss, N. H., Risi, M. M., Bold, K. W., Sullivan, T. P., & Dixon-Gordon, K. L. (2019). Daily relationship between positive affect and drinking to cope: The moderating role of difficulties regulating positive emotions. *The American Journal of Drug and Alcohol Abuse*, *45*(2), 189–198. https://doi.org/10.1080/00952990.2018.1508470

Weiss, N. H., Sullivan, T. P., & Tull, M. T. (2015). Explicating the role of emotion dysregulation in risky behaviors: A review and synthesis of the literature with directions for future research and clinical practice. *Current Opinion in Psychology*, *3*, 22–29. https://doi.org/10.1016/j.copsyc.2015.01.013

White, H. R., Kilmer, J. R., Fossos-Wong, N., Hayes, K., Sokolovsky, A. W., & Jackson, K. M. (2019). Simultaneous alcohol and marijuana use among college students: Patterns, correlates, norms, and consequences. *Alcoholism, Clinical and Experimental Research*, *43*(7), 1545–1555. https://doi.org/10.1111/acer.14072

Yurasek, A. M., Aston, E. R., & Metrik, J. (2017). Co-use of alcohol and cannabis: A review. *Current Addiction Reports*, *4*(2), 184–193. https://doi.org/10.1007/s40429-017-0149-8

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