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Development of the Alcohol and Cannabis Simultaneous Use Scale (ACSUS) in College Students

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Abstract

Background.—Despite the prevalence and negative outcomes associated with simultaneous alcohol and cannabis use (i.e., marijuana [SAM] use; i.e., so that the effects of both alcohol and cannabis overlap) among college students, there is no comprehensive measure of SAM use, with past research relying on single items. The present studies aimed to develop the Alcohol and Cannabis Simultaneous Use Scale (ACSUS), a comprehensive self-report measure of SAM use frequency, quantity, and problems in college students.

Methods.—College students at two Midwestern universities who used alcohol and cannabis (Study 1: *N*=534; Mean age=19; 71% female; 88% White; Study 2: *N*=258; Mean age=21; 81% female; 85% White) completed the newly developed ACSUS.

Results.—Exploratory factor analysis (Study 1) revealed the ACSUS fit best with 9-items representing two factors: Factor 1 measures frequency and quantity of SAM use, and Factor 2 measures associated problems with SAM use. Confirmatory factor analysis (Study 2) supported the two-factor structure of the ACSUS which was positively associated with measures of alcohol use, cannabis use, simultaneous use motives, and impulsivity.

Conclusions.—These data provide initial support for the ACSUS, developed to investigate the frequency, quantity, and associated problems with SAM use in college students.

Keywords

simultaneous alcohol and cannabis use; self-report measure; measure development

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It is well-established that alcohol and cannabis use is as high, if not higher, in college students compared to their non-college peers (Schulenberg et al., 2019). Additionally, simultaneous alcohol and cannabis use (i.e., marijuana [SAM] use; i.e., so that the effects of both substances overlap) is a significant public health concern and is associated with increased impairment and a myriad of negative consequences (e.g., increased depressive symptoms), compared to alcohol and cannabis use only (Bramness et al., 2010; Midanik et al., 2007; Subbaraman & Kerr, 2015; Yurasek et al., 2017).

Despite this, there is no existing self-report measure designed to examine the frequency, quantity, and associated problems with SAM use, with previous studies using single items to measure SAM use (Patrick et al., 2018a; Sokolovksy et al., 2020; Subbaraman & Kerr, 2015). With the high prevalence of, and negative outcomes associated with, SAM use, it is imperative that a comprehensive measure of SAM use is developed. Additionally, it is important to establish concurrent validity with a new SAM use measure and identify potential risk factors of SAM use to aid future research and intervention efforts, such as impulsivity and SAM use motives (Patrick et al., 2018b; Stautz & Cooper, 2013; VanderVeen et al., 2016).

Therefore, the present studies aimed to develop a comprehensive self-report measure of the frequency, quantity, and associated problems of SAM use in college students. In samples of alcohol and cannabis using college students from two different universities, we examined the factor structure of our newly developed SAM use measure and its relations with common measures of alcohol and cannabis use, impulsivity, and SAM use motives.

Study 1

Method

Participants.—A total of 534 college students at a large Midwestern university participated. The majority identified their sex at birth as female (*N*=361). For gender identity, 379 indicated female, 186 indicated male, and 5 students identified as transgender, genderqueer, or gender nonconforming. Most of the sample identified as White (88.4%), followed by Black/African American (6.7%), and Multiracial (3.2%). The average age of the participants was 19.04, with a range from 18 to 28 years old (*SD*=1.66). Most participants were first year students (55.9%), followed by sophomores (24.6%), juniors (10.7%), and seniors (8.3%). Most of the sample identified as exclusively heterosexual (77.7%) and were currently in a dating relationship (59.3%).

Procedure.—Participants were recruited using the Psychology Department's Human Subjects Pool. Interested students were able to view a study advertisement that detailed eligibility criteria, course credit they would receive, and approximate length of the study before participating. Eligible participants had to be 18 years or older, had used alcohol in the past 12 months, had used cannabis in the past 12 months, and had been involved in a dating relationship lasting at least one month in the past 12 months (due to this study being part of a larger project aimed at investigating the potential effects of substance use on dating relationships). Participants were provided an informed consent and completed surveys on Qualtrics.com. After completion of the surveys, participants viewed a debriefing form

detailing the purpose of the study and contact information for the researchers and local mental health resources. Completion of all study procedures took approximately one hour, and students were compensated with credit for their psychology course. The Institutional Review Board approved all procedures prior to data collection.

Measures

Alcohol use.: The AUDIT is a 10-item self-report measure that assesses past 12-month alcohol use and alcohol-related problems (Saunders et al., 1993). Scores on the AUDIT can range from 0 to 40, with higher scores indicating increased alcohol use and related problems. The AUDIT has good internal consistency (Cronbach's alpha in the .80's; Reinert & Allen, 2002) and is a reliable and valid measure for use in college students (e.g., Lundin et al., 2015). The internal consistency in the current sample was good (α=.77).

Cannabis use.: The 8-item CUDIT-R was used to examine past 12-month cannabis use cannabis problems, cannabis dependence, and psychological components of cannabis use (Adamson et al., 2010). The 12-month period was chosen to be consistent with the reporting timeframe of the AUDIT and newly developed simultaneous alcohol and cannabis use measure. CUDIT-R scores range from 0 to 32, with higher scores indicating increased cannabis use and related problems. The CUDIT-R has excellent internal consistency (α=.91) and discriminant validity in identifying cannabis abuse and cannabis dependence (Adamson et al., 2010). The internal consistency in the current sample was good (α=.78).

Alcohol and Cannabis Simultaneous Use Scale (ACSUS).: The first stage of scale development includes creating a working definition of the identified construct (Boateng et al., 2018; DeVellis, 2012). Thus, the authors defined SAM use as "using both alcohol and marijuana on the same occasion so that the effects of alcohol and marijuana overlapped," based on prior SAM use literature (Patrick et al., 2018a). Next, the authors developed an initial pool of items thought to best capture SAM use and problems by adapting items from the AUDIT (Saunders et al., 1993), the CUDIT-R (Adamson et al., 2010), and prior research on SAM use (e.g., Patrick et al., 2018a), which resulted in an initial set of 10 items to examine the frequency, quantity, and associated problems of SAM use (Table 1). An image was utilized from the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU; Cuttler & Spradlin, 2017) that displayed cannabis flower quantities to aid participants in estimating the amount of cannabis used. One question assessed the frequency of heavy drinking while simultaneously using cannabis utilizing the standard heavy drinking definition from the National Institute on Alcohol Abuse and Alcoholism (2019; i.e., 4/5 drinks for women/men).

Additionally, all participants were provided the following instructions before completing the initial pool of 10 items: "The following questions ask about your use of alcohol and marijuana at approximately the same time, so that the effects of each substance overlapped. That is, these questions ask about times you have used alcohol and marijuana together." Response options corresponded to the items from the AUDIT and the CUDIT-R querying similar domains (Adamson et al., 2010; Saunders et al., 1993), with response options

ranging from 0 to 4 for items 1 through 8. For items 9 and 10, responses were coded as 0 (Never), 2 (Yes, but not in the past 12 months), and 4 (Yes, in the past 12 months).

Data Analytic Strategy: Exploratory factor analysis (EFA) with oblique Geomin rotation was conducted in Mplus version 8 (Muthén & Muthén, 1998-2017). A proposed 3-factor model was examined, as research with the AUDIT, one of the measures the ACSUS was modeled after, has suggested 1 to 3 factors (e.g., Carey et al., 2003; Maisto et al., 2000; Rist et al., 2009) and specifying too few factors in EFA is regarded as problematic (Fabrigar et al., 1999). All response options on the new ACSUS were dichotomized for the EFA to meet the assumptions of the model, as the model assumes all items use the same scale, and some items on the ACSUS have different response options (see Appendix). This approach is consistent with factor analyses involving the AUDIT due to different response options on some items (e.g., Peng et al., 2012). Specifically, the first response option for each item (e.g., "never," "1-2") was re-coded as "0" and the remaining response items were coded as "1". Given that items were dichotomized, the means and variance-adjusted weighted least-squares estimator (WLSMV) was used in analyses.

Model fit was evaluated with the χ^2, Comparative Fit Index (CFI), Root-Mean-Square Error of Approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR), as agreement across fit indices is considered the optimal approach (Chen et al., 2008). A nonsignificant χ^2 value supports excellent fit. CFI values at or above .95, RMSEA values at or below .05, and SRMR values at or below .08 indicate good model fit (e.g., Brown, 2006; Hu & Bentler, 1999). Consistent with prior research and recommendations for EFA (e.g., Zhang et al., 2017), we examined patterns of factor loading to make decisions regarding which items to retain. For example, we removed items from the EFA that had large cross-loadings on multiple factors (i.e., >0.30).

After EFA analyses were evaluated, internal consistency estimates for the ACSUS, and bivariate correlations between the ACSUS and the AUDIT and CUDIT-R, were examined in SPSS version 25.0.

Study 1 Results

Results of the 3-factor EFA indicated problems with model convergence, suggesting that analyses should be conducted with a 2-factor solution. Results of the 2-factor solution showed that one item ("*How often did you have a feeling of guilt or remorse after using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped*?") had large cross-loadings on both factors (λ's >0.40) and was removed. Thus, an EFA with up to 2-factors with the remaining 9 items was examined. Results demonstrated that a 1-factor model provided a poor fit to the data (χ^2 (27)=112.80, p<0.01; CFI=0.98; RMSEA=0.08 [90% CI: .06-.09]; SRMR=0.16) relative to a two-factor model (χ^2 (19)=31.59, p<0.05; CFI=0.99; RMSEA=0.04 [90% CI: .01-.06]; SRMR=0.07). Further, model comparisons indicated that a two-factor solution provided a better fit to the data than the 1 factor model ($\Delta\ \chi^2$ (8)=61.44, p<0.01). Thus, the two-factor structure was determined to provide the best fit to the data and was retained.

One item ("*In the past 12 months, were you or someone else injured as a result of your using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped?*") in the two-factor solution significantly loaded on both factors, although the loading on Factor 1 (λ=.21, p<0.05) was less than the standard cutoff of .3, whereas the loading on the Factor 2 (λ=.52, p<0.05) was greater than the cutoff of .3. Thus, this item was retained for Factor 2 (see Table 1). One item ("*How many drinks containing alcohol did you have on a typical day when you were using both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?*") positively loaded on Factor 1 (λ=1.00, p<0.05) and negatively loaded on Factor 2 (λ=−.44, p<0.05), and thus was retained for Factor 1. The first factor (items 1-4) consisted of items that measure SAM use frequency and quantity and the second factor (items 5-9) consisted of items that measure associated problems with SAM use.

Most participants endorsed monthly or less SAM use (82.2%), with 26.3% endorsing SAM use two to four times a month. Further, 35.9% reported drinking three to four alcoholic beverages during a typical SAM use day and 29.8% endorsed heavy drinking (four/five drinks on one occasion for women/men) during a SAM use episode at least monthly. Most participants reported using either 0.125 grams or less (31.5%) or 0.25 grams (25.3%) of smoked or vaped cannabis flower on a typical SAM use day in the past 12 months. Additionally, 4.8% of participants endorsed that they or someone else was injured as a result of their SAM use in the past 12 months and 2.6% reported that a relative, friend, doctor, or other health worker was concerned about their SAM use or suggested they reduce their use in the past 12 months. Nearly one-quarter (23.8%) reported failing to do what was normally expected of them in the past 12 months because of their SAM use. Further, 13.6% reported not being able to stop using cannabis once they started during a SAM use episode and 14.1% reported not being able to stop drinking once they started during a SAM use episode in the past 12 months.

The total score, Factor 1, and Factor 2 of the ACSUS was significantly and positively related to the AUDIT and CUDIT-R (Table 2). The internal consistency of the total ACSUS was adequate (α=0.70), as was Factor 1 (α=0.68) and Factor 2 (α=0.69). ACSUS scores were calculated by either utilizing the total overall score (range from 0 to 36) or using total scores from either factor by summing the appropriate items together, with higher scores indicating more SAM use and related problems. The final 9 items are displayed in the Appendix.

Study 2

Method

Participants.—Students (N=258) at a large Midwestern University participated in Study 2. The majority reported their sex assigned at birth as female (n=184). The majority identified their gender as female (n=208), followed by male (n=45), and transgender and gender nonconforming (n=5). Most participants identified as White (85.3%), followed by Multiracial (6.6%), Asian (5.8%), Black or African American (4.7%), and American Indian or Alaska Native (1.9%)[1]. The average age of participants was 20.54 (SD=1.87), with

[1]Percentages sum to over 100% as participants could select multiple races.

a range of 18 to 47 years. One quarter of the participants were in their senior year of their undergraduate career (27.5%), followed by sophomores (25.2%), juniors (24.8%), and first years (19.4%). The majority identified as exclusively heterosexual (60.1%) and were currently in a dating relationship (53.1%).

Procedure.—Similar procedures were utilized for Study 2 as for Study 1, but Study 2 was performed at a different, large Midwestern university and had different inclusion criteria. Eligible participants for Study 2 had to be 18 years or older, must have used alcohol in the past 12 months, and must have used cannabis in the past 12 months. The Institutional Review Board approved all procedures prior to data collection.

Measures

Simultaneous alcohol and cannabis use.: The 9 items determined to have a good fit from the ACSUS in Study 1 were utilized to examine SAM use. Internal consistency in this sample was adequate for the total score (α=.79), Factor 1 (α=.66), and Factor 2 (α=.77).

Alcohol use.: The AUDIT (Saunders et al., 1993) was used to measure alcohol use and related problems. The internal consistency in this sample was good (α=.81).

Cannabis use.: The CUDIT-R (Adamson et al., 2010) was used to measure cannabis use and related problems. The internal consistency in this sample was good (α=.83).

Impulsivity.: The Short Version of the UPPS-P Impulsive Behavior Scale (SUPPS-P) is a 20-item self-report measure that assesses five facets of impulsivity, including positive urgency (tendency to act impulsively in times of positive affect), negative urgency (tendency to act impulsively in times of negative affect), lack of perseverance (tendency to give up in the face of boredom, fatigue, or frustration), lack of premeditation (tendency to act without consideration of the potential consequences of behavior), and sensation seeking (tendency to pursue activities that are exciting and novel; Lynam et al., 2013). Higher scores on each scale indicate increases in that facet of impulsivity. The SUPPS-P has been shown to have similar internal consistencies and factor structures compared to the full-length UPPS-P Impulsive Behavior Scale (Cyders et al., 2014). The internal consistencies in the present study for each scale were as follows: positive urgency (α=.82), negative urgency (α=.76), lack of perseverance (α=.64), lack of premeditation (α=.79), and sensation seeking (α=.65).

Simultaneous alcohol and cannabis use motives.: SAM use motives were investigated utilizing a 22-item measure developed by Patrick and colleagues (2018b) with alcohol-using young adults. This measure examines four factors, including conformity (“because others are doing it”), positive effects (“to increase intoxication”), calm/coping (“to help me sleep”), and social (“as a way to celebrate”). Scores are summed and then averaged for each type of motive, with higher scores indicating increased endorsement of that type of motive. Internal consistencies for each factor for the present study were as follows: conformity (α=0.89), positive effects (α=.96), calm/coping (α=0.93), and social (α=0.86).

Data Analytic Strategy—Confirmatory factor analysis (CFA) specifying the two factors identified in the EFA (Study 1) was conducted in Mplus version 8 (Muthén & Muthén,

1998-2017). Consistent with the EFA analyses, WLSMV was used in the CFA model due to items being dichotomized. Model fit was evaluated with the χ^2, CFI, RMSEA, and SRMR. Note that the initial factor loading for each factor was set to 1 in order to provide the scaling for each of the factors (Kline, 2016). Bivariate correlations between the ACSUS and the AUDIT, CUDIT-R, SUPPS-P, and the scale measuring SAM use motives were then examined in SPSS version 25.0.

Study 2 Results

Confirmatory factor analyses supported the identified two-factor, 9-item model of the ACSUS, with the specified two-factor model providing a good fit to the data: χ^2 (26)=45.75, p<0.05; CFI=0.99; RMSEA=0.05 (90% CI: .03-.08); SRMR=0.09. Table 3 displays factor loadings from the CFA, with each factor loading statistically significant and greater than .3.

Bivariate correlations (Table 2) revealed that the total score, Factor 1, and Factor 2 of the ACSUS were positively and significantly related to the AUDIT, CUDIT-R, positive urgency, lack of premeditation, positive effects SAM use motives, calm/coping SAM motives, and social SAM use motives. Factor 1 of the ACSUS was positively and significantly correlated with sensation seeking and lack of perseverance. The total score and Factor 2 of the ACSUS were positively and significantly correlated with negative urgency and conformity SAM use motives.

Most participants endorsed monthly or less SAM use (54.7%), with 11.2% reporting SAM use two to four times a month. Further, 26.7% of participants endorsed drinking three or four alcoholic drinks during a SAM use episode and 8.9% reported heavy drinking (four/five or more drinks for women/men) during a SAM use episode at least monthly. Nearly 40% of participants reported using 0.125 grams of cannabis or less and 19.8% reported 0.25 grams of cannabis on a typical SAM use day in the past 12 months. Additionally, 2.7% reported being injured or injuring someone else as a result of their SAM use in the past 12 months and 2.3% indicated that a relative, friend, doctor, or other health worker was concerned about their SAM use or suggested they reduce their use in the past 12 months. Further, 22.9% indicated that they had failed to do what was normally expected of them because of their SAM use in the past 12 months. Additionally, 16.7% reported that they were not able to stop using cannabis once they started during a SAM use episode and 14.7% reported that they were not able to stop using alcohol once they started during a SAM use episode in the past 12 months.

Discussion

The current studies developed a 9-item self-report measure, the ACSUS, to measure SAM use frequency, quantity, and associated problems in college students. In two studies, findings supported the two-factor structure, reliability, internal consistency, and validity of the new ACSUS. Results demonstrated that the ACSUS was significantly and positively correlated with the AUDIT, CUDIT-R, positive urgency, negative urgency, and lack of premeditation subscales of the SUPPS-P Impulsive Behavior Scale, and all four types of SAM use motives: positive effects, calm/coping, conformity, and social, consistent with previous research

(Jackson et al., 2020; Patrick et al., 2018b). To better understand SAM use, we believe it is important to understand an individual's use of alcohol and cannabis both separately and simultaneously. Thus, we believe that the ACSUS is designed to be complementary to both the AUDIT and CUDIT-R.

Future studies should continue to examine the ACSUS in college populations, particularly outside of the Midwest, in non-student populations, and among individuals in substance use treatment. Further, future investigations should examine the ACSUS in conjunction with structured clinical interviews to determine a probable cutoff score within the ACSUS for identifying clinically significant SAM use. In all, the present studies developed and confirmed the factor structure of a new 9-item, self-report measure of SAM use in college students.

Limitations

Both studies were cross-sectional, most participants were White, female, and heterosexual. Additionally, it is possible that someone could have a high score on the ACSUS by scoring either high on items relating mostly to alcohol use or items relating mostly to cannabis use. More studies examining this measure are needed to increase generalizability.

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Appendix

Alcohol and Cannabis Simultaneous Use Scale (ACSUS)

Instructions:

The following questions ask about your use of alcohol and marijuana at approximately the same time, so that the effects of each substance overlapped. That is, these questions ask about times you have used alcohol and marijuana together.

1. How often did you use both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?
   - **a.** Never
   - **b.** Monthly or Less
   - **c.** 2 to 4 times a month
   - **d.** 2 to 3 times a week
   - **e.** 4 or more times a week
2. How many drinks containing alcohol did you have on a typical day when you were using both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?

a. 1 or 2

b. 3 or 4

c. 5 or 6

d. 7 to 9

e. 10 or more

3. Please use the image below to refer to various quantities of marijuana. The image is not to scale; the dollar bill is included to help provide size perspective.

Note: 1/8 of a gram = 0.125 grams,

¼ of a gram = 0.25 grams,

½ of a gram = 0.5 grams,

¾ of a gram = 0.75 grams.

1/8 of an ounce = 3.5 grams,

¼ of an ounce = 7 grams,

½ ounce = 14 grams,

1 ounce = 28 grams

How much marijuana did you use (in grams) on a typical day when you were using both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?

a. 0.125 grams or less

b. 0.25 grams

c. 0.50 grams

d. 0.75 grams

e. 1 gram or more

4. How often did you have 4 (for women) / 5 (for men) or more drinks on one occasion while also using marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?

a. Never

b. Less than monthly

c. Monthly

d. Weekly

e. Daily or almost daily

5. How often during the past 12 months did you find that you were not able to stop drinking once you started when using both alcohol and marijuana on the same occasion, so that the effects of alcohol and marijuana overlapped?

a. Never
b. Less than monthly
c. Monthly
d. Weekly
e. Daily or almost daily

6. How often during the past 12 months did you find that you were not able to stop using marijuana once you started when using both alcohol and marijuana on the same occasion, so that the effects of alcohol and marijuana overlapped?

a. Never
b. Less than monthly
c. Monthly
d. Weekly
e. Daily or almost daily

7. How often during the past 12 months did you fail to do what was normally expected from you because of using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped?

a. Never
b. Less than monthly
c. Monthly
d. Weekly
e. Daily or almost daily

8. In the past 12 months, were you or someone else injured as a result of your using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped?

a. No
b. Yes, but not in the last 12 months
c. Yes, during the last 12 months

9. In the past 12 months, was a relative, friend, doctor, or other health worker concerned about you using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped, or suggested you cut down?

a. No
b. Yes, but not in the last 12 months
c. Yes, during the last 12 months

Scoring Instructions:

Response options were coded from 0 to 4 for items 1 through 7. For items 8 and 9, responses were coded as 0 (Never), 2 (Yes, but not in the past 12 months), and 4 (Yes, in the past 12 months). ACSUS scores can be calculated by either utilizing the total overall score or using total scores from either factor by summing the appropriate items together (items 1-4 for quantity/frequency; items 5-9 for associated problems). The total score can range from 0 to 36, with higher scores indicating more simultaneous alcohol and cannabis use and related problems.

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Table 1

Factor Loadings for Final ACSUS Items from Exploratory Factor Analysis.

	Factor Loadings	
Items	**Factor 1**	**Factor 2**
1. How often did you use both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?	0.94	.08
2. How many drinks containing alcohol did you have on a typical day when you were using both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?	1.0	−.44
3. How much marijuana did you use (in grams) on a typical day when you were using both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?	0.52	.10
4. How often did you have 4 (for women) / 5 (for men) or more drinks on one occasion while also using marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?	0.95	.01
5. How often during the past 12 months did you find that you were not able to stop drinking once you started when using both alcohol and marijuana on the same occasion, so that the effects of alcohol and marijuana overlapped?	−.01	0.91
6. How often during the past 12 months did you find that you were not able to stop using marijuana once you started when using both alcohol and marijuana on the same occasion, so that the effects of alcohol and marijuana overlapped?	.01	0.91
7. How often during the past 12 months did you fail to do what was normally expected of you because of using both alcohol and marijuana on the same occasion, so that the effects of alcohol and marijuana overlapped?	.21	0.52
8. In the past 12 months, were you or someone else injured as a result of your using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped?	.14	0.41
9. In the past 12 months, was a relative, friend, doctor, or other health worker concerned about you using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped, or suggested you cut down?	−.03	0.55

Table 2

Zero-Order Correlations for Study Variables

Study 1	**1**	**2**	**3**	**4**	**5**
1. AUDIT	-----	0.14**	0.43**	0.30**	0.44**
2. CUDIT-R		-----	0.49**	0.45**	0.35**
3. ACSUS Total			-----	0.89**	0.74**
4. ACSUS Factor 1				-----	0.35**
5. ACSUS Factor 2					-----
Mean	9.95	8.71	6.38	5.22	1.10
SD	5.47	5.82	4.24	3.05	2.02

Study 2	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1. AUDIT	-----	0.27**	0.59**	0.51**	0.53**	0.29**	0.20**	0.24**	0.16*	0.10	0.29**	0.24**	0.19*	0.28**
2. CUDIT-R		-----	0.59**	0.52**	0.54**	0.26**	0.18**	0.04	0.16*	0.07	0.24**	0.34**	0.05	0.26**
3. ACSUS Total			-----	0.90**	0.86**	0.29**	0.17*	0.14	0.18*	0.14	0.46**	0.36**	0.18*	0.37**
4. ACSUS Factor 1				-----	0.55**	0.21*	0.14	0.15*	0.17*	0.16*	0.47**	0.26**	0.07	0.32**
5. ACSUS Factor 2					-----	0.32**	0.20**	0.12	0.18**	0.06	0.30**	0.33**	0.36**	0.36**
6. Positive Urgency						-----	0.56**	0.29**	0.40**	0.06	0.30**	0.17*	0.23**	0.33**
7. Negative Urgency							-----	0.17**	0.29**	0.02	0.21**	0.12	0.25**	0.22**
8. Sensation Seeking								-----	0.10	0.02	0.09	0.03	0.10	0.05
9. Lack of Premeditation									-----	0.57**	0.15	−0.08	0.11	0.20*
10. Lack of Perseverance										-----	0.04	−0.15	0.07	0.13
11. Positive Effects Motives											-----	0.42**	0.27**	0.59**
12. Calm/ Coping Motives												-----	0.23**	0.50**
13. Conformity Motives													-----	0.57**
14. Social Motives														-----
Mean	7.98	7.74	5.08	4.01	0.95	1.75	2.25	2.48	1.61	1.68	2.41	1.94	1.56	2.02
SD	5.25	6.25	4.37	2.67	2.19	0.73	0.78	0.74	0.55	0.50	1.30	1.20	0.74	0.98

* $p < .05$

** $p < .01$

Note: AUDIT = Alcohol Use Disorders Identification Test; CUDIT-R = Cannabis Use Disorders Identification Test – Revised; ACSUS = Alcohol and Cannabis Simultaneous Use Scale.

Table 3

Factor Loadings for ACSUS Items from Confirmatory Factor Analysis

	Factor Loadings	
Items	**Factor 1**	**Factor 2**
1. How often did you use both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?	1.00	
2. How many drinks containing alcohol did you have on a typical day when you were using both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?	0.75	
3. How much marijuana did you use (in grams) on a typical day when you were using both alcohol and marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?	0.73	
4. How often did you have 4 (for women) / 5 (for men) or more drinks on one occasion while also using marijuana on the same occasion during the past 12 months, so that the effects of alcohol and marijuana overlapped?	1.00	
5. How often during the past 12 months did you find that you were not able to stop drinking once you started when using both alcohol and marijuana on the same occasion, so that the effects of alcohol and marijuana overlapped?		1.00
6. How often during the past 12 months did you find that you were not able to stop using marijuana once you started when using both alcohol and marijuana on the same occasion, so that the effects of alcohol and marijuana overlapped?		0.99
7. How often during the past 12 months did you fail to do what was normally expected of you because of using both alcohol and marijuana on the same occasion, so that the effects of alcohol and marijuana overlapped?		0.86
8. In the past 12 months, were you or someone else injured as a result of your using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped?		0.84
9. In the past 12 months, was a relative, friend, doctor, or other health worker concerned about you using both marijuana and alcohol on the same occasion, so that the effects of alcohol and marijuana overlapped, or suggested you cut down?		1.00