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Dual Cannabis and Alcohol Use Disorders in Young Adults: Problems Magnified

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Abstract

Background—Alcohol and marijuana are the two most commonly used substances among young adults. The present study examines whether having two DSM-5 diagnoses (alcohol and cannabis) is associated with greater problems than having one (alcohol or cannabis) diagnosis.

Methods—Participants were 307 young adults (18–25 years) from the community who met criteria for DSM-5 alcohol use disorder (AUD), cannabis use disorder (CUD), or both (dual use disorder [DUD]). Participants reported alcohol and marijuana use in the past 90 days (Timeline Follow-Back), alcohol problems (Short Inventory of Problems), and marijuana problems (Marijuana Problems Scale).

Results—Eighty-four participants (27.4%) met criteria for AUD, 107 (34.9%) for CUD, and 116 (37.8%) met criteria for DUD. In multivariate analyses, the DUD group reported greater alcohol use frequency and more alcohol problems than the CUD-only group but not the AUD-only group. However, DUD individuals reported greater drinking intensity than singly diagnosed individuals. Those with DUD reported a greater proportion of marijuana consumption days than the AUD-only group but not the CUD-only group. However, DUD individuals reported more marijuana problems than both singly diagnosed groups.

Conclusions—Results show that the concurrent presence of both DSM-5 AUD and CUD is associated with heavier drinking patterns and greater marijuana problems than disordered use of either substance alone, thus affirming the magnified severity of alcohol and marijuana use that accompanies dual DSM-5 alcohol and marijuana use disorders.

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The authors declare that they have no conflicts of interest.

AUTHOR CONTRIBUTIONS

Michael Stein designed and wrote the protocol for the larger study from which data analyzed in the present study were drawn. Jumi Hayaki conducted the literature searches and summaries of previous related research. Bradley Anderson performed the statistical analyses and wrote the data analysis and results sections. Jumi Hayaki wrote the remainder of the manuscript. All authors contributed to and have approved the final manuscript.

Keywords

Alcohol; cannabis; multiple substance use disorders

INTRODUCTION

Polysubstance use is increasingly common among today's youth, with alcohol and cannabis constituting one of the most frequent drug combinations.^{1–3} Dual use of alcohol and marijuana begins disturbingly early in life, with documented rates among adolescents as high as 23–34% in some studies.^{4,5} Early onset of alcohol and marijuana use is also associated with greater risk of progression to clinically problematic levels.⁴ Thus, young persons who co-use alcohol and marijuana may represent an especially vulnerable group for whom early detection and intervention should be prioritized.

Dual use of alcohol and marijuana is associated with increased alcohol use severity and alcohol-related problems. Many studies of young adults have found that drinkers who also use marijuana report greater drinking frequency, drinking intensity, and/or alcohol-related problems compared to those who use only alcohol.^{6–8} In addition, the association between alcohol consumption and alcohol-related problems appears stronger among dual users than among those who use alcohol only.⁸

Less is known about whether dual use of alcohol and marijuana is associated with increased marijuana use severity and marijuana-related negative consequences. Preliminary evidence shows that dual use is associated not only with greater alcohol consumption but also with greater marijuana use frequency.⁵ Clinical studies also suggest that alcohol potentiates problems typically attributed to marijuana use.⁹ However, few studies have explicitly examined marijuana use patterns, particularly marijuana-related problems, among dual alcohol and marijuana users.

Although dual alcohol and marijuana use is associated with greater substance use severity and associated problems for alcohol and perhaps also for marijuana, questions remain because this literature is marked by inconsistency and/or lack of validation in the operational definitions of dual use. Many studies rely upon a single frequency item to determine a participant's dual use status^{2,6} or define dual use as a count variable. Dual use, then, could signify use of either or both substances at very low frequency and potentially fail to distinguish the main effects of alcohol and cannabis use from the effects of dual use. Thus, the effects of “dual” use may be solely or predominantly due to a single substance.

Examining individuals who carry substance use disorder diagnoses may be an alternative way to compare alcohol and/or cannabis users. With only a few exceptions,¹⁰ researchers have not used validated psychiatric diagnostic profiles to classify participants with respect to the negative consequences of alcohol and/or cannabis use. This method mitigates some of the sample heterogeneity seen in previous work. It also unambiguously distinguishes the effects of dual use disorder from those of alcohol use disorder (AUD) or cannabis use disorder (CUD). The extant research suggests that individuals with multiple substance use disorder diagnoses do indeed tend to exhibit an especially severe clinical course¹⁰ and poor

prognosis.¹¹ However, little prior work specifically compares singly versus dually disordered alcohol and marijuana users. To the extent that particular drug use combinations may be associated with unique patterns of substance use problems, it is important to establish the specific association between disordered alcohol and/or cannabis use and use severity and associated problems.

The current study uses the presence of DSM-5¹² AUD and CUD diagnoses to classify participants as alcohol disordered, cannabis disordered, or dual disordered users. Given prior work documenting greater substance use severity and related problems among dual users,^{2,5,7} we hypothesized that, compared to users with either alcohol or cannabis use disorder only, users with both diagnoses would exhibit greater alcohol and marijuana use frequency and associated problems.

METHODS

Study Design and Participants

Study participants were recruited between January 2012 and March 2015 for a health behaviors study among emerging adults who use alcohol or marijuana. Recruitment targeted the Southern New England geographical area online through Craigslist and Facebook advertising, and through advertisements placed in local college newspapers, on public transportation, and on commercial radio. Interested individuals called the study number or emailed the study address to receive a call back and were given a 10-minute anonymous phone screen. The screen included questions about basic demographics, substance use, sexual activity, mental health, and general health. Eligible individuals were invited for an in-person interview at the research site and offered compensation (\$40) and free Sexually Transmitted Infection testing.^{13,14} The study was approved by the Butler Hospital Institutional Review Board.

Eligibility criteria included being 18–25 years old, reporting use of alcohol or marijuana at least once in the last 30 days, being heterosexually active in the last six months, not having suicidal ideation in the past two weeks, and living within 30 minutes of the research site. Of the 2,426 individuals screened by phone, 1,117 were ineligible. The main reasons for ineligibility were not being heterosexually active (332), not using alcohol or marijuana (169), being outside the age range (98), having suicidal ideation (123), and living at a distance (33); others were ineligible for more than one of these reasons. The remaining 1,309 eligible persons were invited for an interview, and 760 were either not interested (n=79 actively refused; n=117 passively refused, i.e., said they would call back to schedule an appointment, but never did; or were already participating in a research study) or did not keep a scheduled appointment (n=564).

Five hundred forty-nine individuals completed a baseline assessment administered by trained interviewers, after which 19 persons were found to be ineligible and 7 withdrew their participation. Of the 523 participants who completed interviews, 216 did not meet DSM-5 criteria for either AUD or CUD and were excluded from the current analysis. The analyzed sample consisted of 307 participants.

Measures

Alcohol and Marijuana Use Measures—Participants reported alcohol and marijuana use during the 90 days prior to the interview using the Timeline Follow-Back (TLFB).¹⁵ Participants indicated the quantity of alcohol used on drinking days. Binge drinking was defined as consuming 4 or more drinks for women, 5 or more for men, in a two-hour period. Summary measures based on the TLFB are expressed as rates of drinking days/30 days. Marijuana use frequency was expressed as days of marijuana use/30 days.

Alcohol and Marijuana Problem Measures—Alcohol related problems (e.g., “I have failed to do what is expected of me because of my drinking,” “My family has been hurt by my drinking”) were measured using the Short Inventory of Problems (SIP¹⁶), a 16-item measure with a reliability coefficient of .98 in a previous sample,¹⁷ .90 in this sample. Marijuana use-related problems (e.g., “problems between you and your friends,” “financial difficulties,” and “legal problems”) were measured using the Marijuana Problems Scale (MPS^{18,19}), a 19-item measure with reliability coefficients above .90 in previous samples,^{19,20} .85 in this sample.

Alcohol and Cannabis Disorder Measures—Alcohol use disorder (AUD) and cannabis use disorder (CUD) were assessed using the SCID,²¹ a reliable and well-validated structured clinical assessment tool that probes DSM-IV diagnostic criteria. Interviewers were non-clinicians who were trained by a doctoral-level clinical psychologist with over 15 years of experience training and administering the SCID and other clinical interviews. Although the DSM-5 had not yet been published at the time that study interviews began, we followed recommendations from the DSM-5 Substance-Related Disorders Work Group²² in order to assess DSM-5 defined disorders. Specifically, we supplemented the DSM-IV alcohol and cannabis abuse and dependence items with a probe for regularly occurring cravings/ desires (“In the past 3 months, have you often had cravings or strong desires or urges to use alcohol [marijuana]?”), as has been done in previous research.²³ Participants endorsing two or more of the items, including our additional question regarding cravings/ desires, were considered to have met criteria for DSM-5 AUD or CUD. Severity of AUD and CUD was coded according to number of criteria endorsed (No disorder = 0 or 1 symptoms; Mild or More severity = 2 or more symptoms¹²). For the purpose of the present study, persons who did not meet criteria for AUD or CUD were omitted from analyses.

Analytical Methods

We present descriptive statistics to characterize the sample. Summary frequency measures of alcohol use, binge drinking, and marijuana use based on TLFB data are distinctly non-normally distributed, with a preponderance of cases clustered at or near the minimum and maximum limits. We provide unadjusted between group differences with respect to means and mean rates of use/30 TLFB days but focus attention on the specific comparisons of dual use disorder with alcohol use disorder only, and with cannabis use disorder only, after adjusting for age, sex, and ethnicity. For statistical comparisons the rates are transformed to proportions and analyzed using the fractional logit model²⁴ with robust standard errors. We used OLS regression with robust standard errors to analyze the adjusted association of substance use disorder type with mean drinks/day, the SIP, and the MPS.

RESULTS

Demographic and other sample characteristics are presented in Table 1. On average, participants reported using alcohol on 8.3 (± 5.5 , Median = 8) days per month; 11 (3.6%) persons reported no use of alcohol, and only 1 (0.3%) person reported daily use. The mean rate of binge drinking was 4.5 (± 4.3 , Median = 3) days per month, and participants averaged 1.44 (± 1.37 , Median = 1) drinks per day on the TLFB. Mean SIP scores were 7.8 (± 7.0 , Median = 6.0). The mean rate of reported marijuana use was 15.5 (± 12.3 , Median = 14) days/month, and MPS scores averaged 5.49 (± 5.08). Forty-eight (15.6%) reported no use of marijuana and 94 (30.6%) reported daily use. Eighty-four participants met DSM-5 criteria for mild or more severe AUD, 107 (34.9%) for mild or more severe CUD, and 116 (37.8%) met criteria for both AUD and CUD, which we refer to as dual use disorder (DUD).

Unadjusted associations between substance use disorder type and all 5 outcomes are statistically significant (Table 2). Those with AUD and DUD had markedly higher mean rates of alcohol than those with CUD. Those with DUD had the highest rates of binge drinking and the highest reported mean drinks/TLFB day, followed by AUD and CUD. Those with CUD reported lower SIP scores than those with either AUD or DUD; mean SIP scores were very similar among those with AUD and those with DUD. Those with AUD had much lower mean rates of marijuana use and marijuana problem severity scores than those with either DUD or CUD.

Adjusted associations are also presented in Table 2. We focus attention on the contrasts comparing those with DUD (reference category in multivariate models) to those with only AUD or CUD. Relative to those with dual disorder, those with CUD only consumed alcohol significantly less frequently ($b = -0.80$, $p < .001$), binged significantly less frequently ($b = -0.99$, $p < .001$), had significantly lower mean drinks/TLFB day ($b = -1.22$, $p < .001$), and had significantly lower mean SIP scores ($b = -6.73$, $p < .001$). Those with DUD did not differ significantly from those with AUD with respect to frequency of consuming alcohol ($b = -0.06$, $p > .05$). Those with only AUD binged significantly less frequently than those with DUD ($b = -0.39$, $p < .05$), and they reported significantly lower mean drinks/TLFB day ($b = -0.53$, $p < .01$); this difference is over $\frac{1}{2}$ a drink per day or about 15 drinks/month. SIP scores did not differ significantly between those with DUD and those with AUD only. Those with AUD reported using marijuana significantly less frequently than those with DUD ($b = -2.72$, $p < .001$), while frequency of marijuana use did not differ significantly between those with CUD only and those with DUD ($b = 0.65$, $p > .05$). Those with DUD had significantly higher mean MPS scores than those with AUD only ($b = -6.36$, $p < .001$) and those with CUD only ($b = -1.61$, $p = .015$).

DISCUSSION

This study expands prior work on dual alcohol and marijuana use in two important ways. First, we utilized DSM-5¹² alcohol and cannabis use disorder diagnoses to classify users of these two substances as alcohol disordered, marijuana disordered, or dual disordered persons. This allowed a more comprehensive comparison of singly and dually disordered individuals on several alcohol and marijuana use variables, thus contributing to a multiple

substance use disorder literature that has not previously examined this particular combination of disorders or addressed marijuana-related problems. Second, we included a broader spectrum of young adults than prior studies of alcohol and cannabis use, which have focused on adolescents^{1,4,5,25} or college students,^{6,8} thus capturing the age group with the highest use rates for these two substances.³

Our results indicate that, compared to persons with only AUD or CUD, those with both disorders (i.e., those with DUD) exhibited equivalent or worse correlates on all past month alcohol and cannabis use behaviors measured. In this sample, individuals meeting criteria for both AUD and CUD matched those with only AUD on frequency of alcohol use but outranked them on binge drinking frequency and drinking intensity (mean drinks/TLFB day). Those with DUD did not differ from those with only AUD on alcohol-related problems. Findings regarding binge drinking frequency and drinking intensity are consistent with previous reports comparing dual and alcohol-only users.^{2,26} However, the finding that those with DUD were similar to those with only AUD on both frequency of alcohol consumption and alcohol-related problems is at odds with previous reports.⁶⁻⁸ This seeming discrepancy could reflect the fact that both the AUD-only and DUD individuals in this study met criteria for a DSM-5 AUD, whereas substance use disorder status was not assessed in previous research. As such, it is possible that the present sample as a whole drank more frequently than did samples from previous studies. If so, then it is noteworthy that the dually disordered users still outranked AUD-only users in heavy drinking patterns, as the latter group exhibited enough alcohol consumption and associated problems to meet criteria for an alcohol-related psychiatric diagnosis. Although this high-risk drinking pattern did not reveal additional alcohol-related problems in this study, it is entirely possible that it could be associated with other problems that were not measured. Thus, our findings suggest that, among individuals with AUD, problematic levels of marijuana use (CUD) can create an especially high-risk pattern of alcohol consumption. Whether this level of drinking is the cause or result of using two substances can only be addressed through prospective measurement.

In this study, those with DUD exhibited more frequent overall, as well as heavy episodic, drinking patterns, compared to those with CUD only. This specific comparison has not appeared previously in the literature. It stands to reason that those with DUD or AUD should perform worse on alcohol outcomes than those with CUD only. However, it should also be pointed out that, in this sample, those with CUD binged almost 3 times on average in the past month and also experienced some alcohol-related problems in that time frame. Thus, dual disordered use does appear to confer disadvantage, not only over individuals whose primary problematic substance of choice is alcohol, but also over individuals with primarily cannabis use problems.

Further comparisons between the DUD and AUD-only or CUD-only groups showed that the dual disorder group used marijuana more frequently than those with only AUD, but not more frequently than those with only CUD. Although previous work with adolescents has shown dual use to be associated with high levels of marijuana use frequency,⁵ to our knowledge, no other study to date has compared dually disordered and CUD-only individuals on marijuana use characteristics. The present findings suggest that, once a clinical diagnosis of CUD is

achieved, the additional presence of AUD does not increase levels of marijuana use. However, it should be noted that the CUD-only group here reported especially high levels of marijuana use that occurred on over two-thirds of the days in the past month. Further work is necessary with individuals exhibiting lower levels of marijuana use and/or less severe forms of CUD.

Although the DUD group did not differ from the CUD-only group on marijuana use frequency, they did report more marijuana-related problems compared to both the AUD-only and CUD-only groups. This finding is consistent with expectation and partially corroborates prior reports of substance use severity among dual users,^{10,25} though previous studies did not assess the presence of DSM-5 CUD explicitly. Our results suggest that the CUD-only group used marijuana as often as did the DUD group, but that marijuana use among the latter was more intense and accompanied by more problems. This is particularly noteworthy, as the CUD-only group itself experienced a substantive level of marijuana problems.

This study has some limitations. First, measurement was cross-sectional, thus precluding causal inferences regarding the progression of dual use, as well as the timeline of meeting DSM-5 criteria for AUD and/or CUD. Second, our community sample had higher overall substance use severity than has been observed in other studies (60% of persons interviewed here had a disorder, most likely due to our advertising specifically for alcohol/marijuana users). In addition, our analytical strategy did not permit us to examine important patterns of single and dual use among individuals without formal AUD and/or CUD diagnoses. On the other hand, limiting our analysis to those with such diagnoses allowed for greater homogeneity, thus avoiding problematic operational definitions of severity and dual use found in other studies. Replication is necessary to determine whether our findings generalize to other young adult samples, including those with subclinical manifestations of AUD and/or CUD.

Dual use of alcohol and marijuana has been associated with particularly high substance use severity and problems in past research. The current study additionally shows that the concurrent presence of both DSM-5 alcohol and cannabis use *disorders* in young adults is associated with heavier, more intense drinking patterns than disordered use of either substance alone. It also documents greater marijuana use problems among dually disordered individuals—despite a frequency of use that matches that of individuals meeting criteria for cannabis use disorder only. Our findings are consistent with prior work on individuals carrying other combinations of substance use disorders who exhibit greater substance use severity and other associated problems.^{11,27} Our findings affirm the increased severity of alcohol and marijuana use that characterizes dual DSM-5 alcohol and marijuana disorders, thus identifying an especially vulnerable group of substance users requiring clinical attention. Future research should examine additional non-substance-related problems of dually disordered alcohol and marijuana users in order to elucidate comorbidities and inform treatment options for this especially high-risk group of substance users.

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Table 1

Background Characteristics and Substance Use (n= 307).

	n (%)	Mean ($\pm$SD)	Median	Range
Years Age		21.3 ($\pm$ 2.0)	21.0	18 – 25
Sex (Male)	153 (49.8%)			
Race/Ethnicity				
Caucasian	193 (62.9%)			
African-American	39 (12.7%)			
Latino	41 (13.4%)			
Other	34 (11.1%)			
Days Alcohol Use/30		8.26 ($\pm$ 5.48)	8.0	0 – 30
Days Binged/30		4.50 ($\pm$ 4.31)	3.0	0 – 26
Mean Drinks/Day		1.44 ($\pm$ 1.37)	1.0	0 – 10.9
SIP		7.83 ($\pm$ 6.98)	6.0	0 – 41
Days Marijuana Use/30		15.5 ($\pm$ 12.3)	14.0	0 – 30
Marijuana Problem Severity		5.49 ($\pm$ 5.08)	5.0	0 – 28
DSM-5 Disorder Typology				
Alcohol Only	84 (27.4%)			
Cannabis Only	107 (34.9%)			
Alcohol and Cannabis	116 (37.8%)			

Table 2

Substance Use Outcomes by Substance Abuse Disorder Typology (n = 307).

Disorder Type	Unadjusted Means and Mean Rates by Substance Use Disorder Typology					
	Drinking Frequency	Binge Frequency	Drinking Intensity	Alcohol Problems	Marijuana Use Frequency	Marijuana Problems
Alcohol Only	9.74 ($\pm$ 4.52)	4.37 ($\pm$ 4.04)	1.41 ($\pm$ 1.12)	9.99 ($\pm$ 6.42)	2.77 ($\pm$ 6.38)	1.39 ($\pm$ 2.20)
Cannabis Only	5.49 ($\pm$ 4.89)	2.76 ($\pm$ 3.36)	0.84 ($\pm$ 1.01)	3.54 ($\pm$ 4.45)	22.6 ($\pm$ 9.22)	6.20 ($\pm$ 4.47)
Dual Disorder	9.76 ($\pm$ 5.67)	6.22 ($\pm$ 4.62)	2.00 ($\pm$ 1.58)	10.2 ($\pm$ 7.45)	18.2 ($\pm$ 11.2)	7.80 ($\pm$ 5.34)
F or χ^2 (p =) ^a	41.8 (< .001) ^a	38.0 (< .001) ^a	22.7 (< .001) ^b	50.5 (< .001) ^b	114.6 (< .001) ^a	54.57 (< .001) ^b
Predictor	Multivariate Model Outcomes					
	Prop. Days Alcohol ^c	Prop. Days Binge ^c	Drinking Intensity ^d	Alcohol Problems ^d	Prop. Days Marijuana ^c	Marijuana Problems ^d
Sex (Male)	0.25 **	0.32 **	0.70 ***	-0.05	0.30	-0.10
Years Age	0.09 ***	-0.01	0.04	0.10	0.01	-0.09
Race/Ethnicity						
African-American	-0.55 ***	-0.09	-0.02	0.29	-0.36	-0.24
Latino	-0.10	-0.10	0.23	-1.49	0.02	-0.10
Other	-0.098	-0.20	0.11	-1.54	-0.13	-0.51
Caucasian [REF]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Disorder Type						
Alcohol Only	-0.06	-0.39 *	-0.53 **	-0.34	-2.72 ***	-6.36 ***
Cannabis Only	-0.80 ***	-0.99 ***	-1.22 ***	-6.73 ***	0.65	-1.61 *
Dual Disorder [REF]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]

* p < .05,

** p < .01,

*** p < .001

^a Wald chi-square statistic with 2 degrees of freedom for the fractional logit model.

^b F-statistic for differences in means with 2 and 304 degrees of freedom.

^c Fractional logit model with robust standard errors.

p OLS regression model with robust standard errors.

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