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Psychosocial and health problems associated with alcohol use disorder and cannabis use disorder in U.S. adults

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Abstract

Background—Although the problems associated with alcohol use disorder (AUD) are well known, little is known about the psychosocial problems associated with cannabis use disorder (CUD), and the harmfulness of CUD relative to AUD. We compared the odds of psychosocial and health-related problems between individuals with DSM-5 AUD-only, CUD-only and co-occurring AUD+CUD.

Methods—The 2012–2013 NESARC-III, a nationally representative cross-sectional survey of non-institutionalized US adults (n=36,309), assessed participants for DSM-5 AUD, CUD, and psychosocial (interpersonal, financial, legal) and health-related problems. Based on their responses, participants were categorized into mutually exclusive groups: no AUD/CUD, AUD-only, CUD-only, and AUD+CUD. Multivariable logistic regression models examined the associations between psychosocial problems and the four AUD/CUD groups, adjusting for sociodemographic characteristics.

Results—People with AUD-only, CUD-only, and AUD+CUD had higher odds of most interpersonal problems (adjusted odds ratio [aORs] 1.07–4.01), financial problems (aORs 1.53–4.28), legal problems (aORs 3.34–7.71), and health-related problems (aORs 1.29–1.92). The odds of psychosocial and health-related problems were similar for CUD-only and AUD-only in direct comparisons. Compared to those with AUD-only, those with AUD+CUD had higher odds of most

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Contributors

All authors contributed to the design of the study. Sarah Gutkind and Dvora Shmulewitz conducted the statistical analysis, and Deborah Hasin provided supervision. All authors contributed to the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

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CRedit authorship contribution statement

Sarah Gutkind: Conceptualization; Data curation; Formal analysis; Project administration; Roles/Writing - original draft; Writing - review & editing. **David Fink:** Conceptualization; Roles/Writing - original draft; Writing - review & editing. **Dvora Shmulewitz:** Conceptualization; Data curation; Supervision, Formal analysis; Roles/Writing - original draft; Writing - review & editing. **Malka Stohl:** Conceptualization; Data curation; Writing - review & editing. **Deborah Hasin:** Funding acquisition; Resources; Software; Supervision; Conceptualization; Data curation; Formal analysis; Project administration; Roles/Writing - original draft; Writing - review & editing.

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problems examined (aORs 1.42–2.31). In contrast, there were few differences when comparing AUD+CUD with CUD-only.

Conclusions—AUD and CUD were similarly associated with interpersonal, financial, and legal problems, emergency treatment and suicide attempt. People with AUD+CUD had higher odds of certain problems than individuals with either AUD-only or CUD-only. Although most people who use cannabis do not experience harms, our results indicate that CUD does not appear to be less harmful than AUD.

Keywords

Alcohol Use Disorder; Cannabis Use Disorder; NESARC-III; psychosocial problems; health problems

INTRODUCTION

Alcohol and cannabis are the two most widely used substances in the United States (US) (Substance Abuse and Mental Health Services Administration, 2020). Among people aged 12 or older in 2019, 50.8% drank alcohol and 11.5% used cannabis in the past month (Substance Abuse and Mental Health Services Administration, 2020). Whereas alcohol use in 2019 was similar to the levels in 2002–2004, the prevalence of past month cannabis use in the US has nearly doubled over this same period, increasing from 6.2% to 11.5% from 2002 to 2019, respectively (Substance Abuse and Mental Health Services Administration, 2020). Increasing rates of cannabis use among all adult age groups in the US (Compton et al., 2016; Hasin, 2018; Substance Abuse and Mental Health Services Administration, 2020) during a period in which perception of risk related to cannabis use decreased (Compton et al., 2016), and support for US recreational cannabis legalization broadened widely (McGinty et al., 2017; McGinty et al., 2016) suggest a more mainstream adoption and societal normalization of cannabis use (Parker et al., 2002). Several sources of information indicate that prevalence of cannabis use disorder (CUD) have increased as well (Bonn-Miller et al., 2012; Charilaou et al., 2017; Gubatan et al., 2016). Although the psychosocial and health problems associated with alcohol use disorder (AUD) are well established (Grant, Bridget F. et al., 2015a; Greenfield et al., 2015; Hasin et al., 2007; Rehm et al., 2003), less is known about the problems associated with CUD, and no studies have directly compared the burden of psychosocial and health problems between those with AUD and those with CUD in the adult general population.

Heavy alcohol use (Grant et al., 2017; National Institute on Alcohol Abuse and Alcoholism, 2021), increases the risk of developing AUD, which is characterized by persistent and problematic patterns of use that contribute to functional impairment and distress (Association, 2013). Adverse consequences associated with alcohol use and AUD are well characterized in the literature, including motor vehicle crashes, alcohol withdrawal, alcohol-related liver cirrhosis, hospitalizations, and death due to alcohol poisoning (Corrao et al., 2004; Dawson et al., 2008; Grant et al., 2017). However, an ongoing misperception that CUD is rare among people who use cannabis stems from data now several decades old (Anthony et al., 1994; Watson et al., 2000; Williams and Hill, 2019) that were collected before major changes in the cannabis landscape, including cannabis norms and more potent

products. Although the vast majority of people who use cannabis will never go on to develop disorder (Anthony et al., 1994; Watson et al., 2000), national survey data indicated that 2–3 out of 10 people who use cannabis met criteria for CUD (Hasin et al., 2016; Hasin, D. S. et al., 2015). Further, among those with CUD, 23% had severe CUD (6 criteria) (Hasin et al., 2016), 48% of whom were not functioning in any social role (Hasin et al., 2016). Recent evidence from a meta-analysis suggests that among individuals who use cannabis, one in five will develop CUD, and among individuals who use cannabis frequently (at least weekly use to daily use), the risk is even higher, with 1 out of 3 people developing CUD (Leung et al., 2020). Taken together, this suggests that CUD among people who use cannabis is not uncommon. Despite increases in cannabis use and subsequent CUD, relatively few studies have systematically documented the specific psychosocial and health problems associated with CUD (Hasin, 2018). This paucity of information about the harms of CUD may have led to misperceptions of cannabis' safety in general (Williams and Hill, 2019), and particularly of its safety relative to alcohol, given the well-established harms and risks of AUD (Substance Abuse and Mental Health Services Administration, 2020). However, AUD and CUD are both markers of heavy, and problematic use and cause for public health concern. Therefore, a better understanding of the psychosocial and health consequences of CUD and how these directly compare to those from AUD is needed.

The aims of this study are two-fold: 1) to investigate the burden of psychosocial and health problems associated with CUD in the US adult population, and 2) to compare the burden of these problems between those with AUD, those with CUD, and those with both AUD and CUD. Using data from the 2012–2013 National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III), we investigated differences in the burden of interpersonal, financial, legal, and health problems among persons with alcohol use disorder-only (AUD-only), cannabis use disorder-only (CUD-only), or co-occurring AUD and CUD (AUD+CUD), compared to those with no substance use disorder as well as direct comparisons of AUD-only and CUD-only. Because DSM-5 defines all substance use disorders similarly, i.e., a cluster of cognitive, behavioral, and physiological symptoms indicating that the individual continues using the substance despite significant substance-related problems (Association, 2013; Hasin et al., 2013), we hypothesized that: 1) AUD would be independently associated with substantial psychosocial and health harms; 2) CUD would be associated with levels of psychosocial and health harms similar to persons with AUD; and 3) people with AUD+CUD will exhibit even higher levels of harms than those with AUD-only or CUD-only.

METHODS

Study Design and Participants

The 2012–2013 NESARC-III is a nationally representative cross-sectional survey of 36,309, non-institutionalized adults, 18 and older, residing in households and group quarters in the U.S.—selected through multistage probability sampling (Grant, B. F. et al., 2015). The household response rate, the person-level response rate, and the overall response rate was 72%, 84%, and 60%, respectively. Sample weights adjusted the data for oversampling and non-response to represent the general population (Grant et al., 2014; Grant, B. et al., 2015;

Koob). Trained interviewers conducted face-to-face interviews between April 2012 and June 2013 using computer-assisted interviews. Informed consent was recorded electronically and participants were compensated for participation. The NESARC-III protocols and consent procedures were approved by Institutional Review Boards at the National Institutes of Health and Westat.

Assessments

The Alcohol Use Disorder and Associated Disabilities Interview Schedule 5th Edition (AUDADIS-5) assessed alcohol and drug use using a structured diagnostic interview (Grant, Bridget F. et al., 2015b; Hasin, Deborah S. et al., 2015). AUDADIS-5 uses the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria to assess substance use disorders and other psychiatric disorders in the last 12 months and prior to the last 12 months (Grant, Bridget F. et al., 2015b; Hasin, Deborah S. et al., 2015). Test-retest reliability of past 12-month DSM-5 AUD, and past 12-month DSM-5 CUD were substantial ($\kappa=0.62$, and 0.41 , respectively) in a general population (Grant, Bridget F. et al., 2015b). Procedural validity of the substance use disorder modules was assessed through clinical re-appraisal using the semi-structured, clinician-administered Psychiatric Research Interview for Substance and Mental Disorders, DSM-5 version (PRISM-5) in a separate sample of the general population (Hasin, Deborah S. et al., 2015). AUDADIS-5/PRISM-5 concordance was moderate for past-12 month AUD and past-12 month CUD ($\kappa=0.62$, and 0.60 , respectively) (Hasin, Deborah S. et al., 2015).

Outcomes

Past-year problems were assessed in a separate module of the AUDADIS-5 with questions that did not include any link to substance use. Those related to interpersonal relationships included trouble with employer or co-workers; serious problems with a neighbor, relative or friend; and ending a serious relationship. Financial problems included dismissal from employment; unemployment ≥ 1 month; homelessness; debilitating debt; and bankruptcy. Legal consequences included problems with law enforcement. From a separate AUDADIS-5 module on healthcare services use, health-related experiences included hospitalization; emergency department treatment; and attempted suicide at the current age.

Predictors

Alcohol and cannabis use disorders—AUD and CUD were assessed using the AUDADIS-5. AUD and CUD diagnoses required endorsement of two or more DSM-5 criteria occurring in the past 12 months (National Institute on Alcohol Abuse and Alcoholism, 2019). The disorders were assessed in separate modules with detailed questions that measured the 11 DSM-5 criteria. Responses to these criteria were combined using a computer algorithm, and a diagnostic code for AUD or CUD was assigned. A combined AUD and CUD predictor was constructed (AUD+CUD) using the diagnostic codes, with four response levels: AUD only; CUD only; AUD+CUD; no AUD or CUD. The four-level predictor variable allowed us to make between group comparisons for the odds of problems. Those with any other substance use disorder in the past year ($n=659$) were excluded, for an analytic sample of 35,650.

Control variables

Covariates included sex, age, education (less than high school, high school, or greater than high school), and race/ethnicity (Hispanic, non-Hispanic White, non-Hispanic Black, non-Hispanic American Indian/Alaska Native/Asian/Native Hawaiian/Pacific Islander, and non-Hispanic mixed race).

Statistical Analyses

We used multivariable logistic regression to estimate adjusted odd ratios (aOR) and 95% confidence intervals (95% CI) comparing problems among people who report no alcohol or substance use disorder (reference group) with people who have AUD-only, people with CUD-only, and people with co-occurring AUD+CUD. We then compared problems among people who have AUD-only (as a second reference group) with people who have CUD-only, and with people who have AUD+CUD. Finally, we compared problems among people who have CUD-only (as a third reference group) with people who have AUD+CUD. An aOR greater than 1 indicates greater likelihood of problems with the index group, whereas an aOR below 1 indicates greater likelihood of outcome with the reference group. A 95% CI that includes 1 suggests that the data may be compatible with no difference in the likelihood of problems among the two groups. We used a p-value of 0.05 as our critical value for significance. Analysis was carried out using SUDAAN 11.0.1 using sample weights to adjust for the complex sampling design.

RESULTS

Sample Description (Table 1)

Overall, the analytic sample (n=35,650) was approximately half male (48%), 45 years or older (35.1%); two-thirds non-Hispanic White (66.1%), and almost two thirds had greater than a high school education (61.4%) (Table 1). Those who reported no AUD or CUD had very similar characteristics to the overall sample. However, sociodemographic characteristics differed for those with AUD and/or CUD, with these groups showing a higher prevalence of men, those of younger age, non-Hispanic Black race/ethnicity, and lower education. Prevalence of the psychosocial problems by each AUD/CUD group are shown in Supplemental Table 1.

Likelihood of psychosocial and health problems by disorder group (Table 2)

Compared to those with no disorder, those with AUD-only, CUD-only, and AUD+CUD had significantly higher odds of reporting interpersonal problems, including problems with a neighbor, relative or friend (aORs: 2.04, 3.97 and 3.72, respectively), and breaking up a major relationship (aORs: 2.37, 2.42, and 4.01, respectively). Individuals with AUD-only, and AUD+CUD also had significantly higher odds of reporting trouble with a boss or co-workers (aORs: 1.87, and 2.83, respectively), compared with people who reported no use disorder. Compared to those with no disorder, individuals with AUD-only, CUD-only, and AUD+CUD had significantly higher odds of reporting almost all financial problems, including job loss (aORs: 1.69, 2.02, and 2.08, respectively), unemployment (aORs: 1.53, 2.75, and 2.75 respectively), homelessness (aORs: 2.78, 4.26, and 4.28, respectively), and

unrepayable debt (aORs: 1.90, 2.33, and 2.79, respectively). None of the disorder groups had higher odds of declaring bankruptcy. People with AUD-only, CUD-only, or AUD+CUD had significantly higher odds of reporting problems with the police (aORs: 3.34, 3.62, and 7.71, respectively), compared with people who had no use disorder. People with AUD-only, CUD-only, or AUD+CUD also had higher odds of health-related problems including emergency treatment (aORs: 1.29, 1.74, and 1.92, respectively). In addition, those with AUD+CUD showed greater odds of hospitalization (aOR=1.92) compared with no use disorder, and people with AUD-only and AUD+CUD had higher odds of a suicide attempt in the past year (aORs; 3.48, and 6.88 respectively).

In direct comparisons of those with AUD-only and those with CUD-only, those with CUD-only had higher odds of reporting problems with a neighbor, relative or friend (aOR=1.95), unemployment (aOR=1.80), and emergency treatment (aOR=1.35) than those with AUD-only, while the AUD-only group did not have higher odds than the CUD-only group for any of the problems. Compared to AUD-only, co-occurring AUD+CUD had significantly higher odds of all interpersonal problems (aORs: 1.51–1.83), financial problems (unemployment [aOR=1.79], unrepayable debt [aOR=1.47]), legal problems (trouble with law or police [aOR=2.31]), and health-related problems (hospitalization [aOR=1.70], emergency treatment [aOR=1.49]). However, compared to CUD-only, co-occurring AUD+CUD had higher odds of a few problems, including trouble with boss or co-workers (aOR=2.00), breaking up a major relationship (aOR=1.66), trouble with the police or law (aOR=2.13), and hospitalization (aOR= 2.43).

DISCUSSION

This is the first study to directly compare the odds of interpersonal, financial, legal, and health-related problems among persons reporting AUD, CUD, and co-occurring AUD and CUD. In a nationally representative sample of US adults, respondents with AUD, CUD, and co-occurring AUD and CUD had greater odds of interpersonal, financial, legal, and health-related problems than individuals with neither disorder. The odds of most problems were similarly high among those with AUD-only and those with CUD-only, but CUD-only was associated with greater odds of problems with a neighbor relative or friend, and unemployment than AUD-only. The co-occurring AUD and CUD group had higher odds of certain problems than individuals with either substance use disorder alone when compared with neither disorder. Of note, while individuals with AUD+CUD had higher odds of almost all problems compared with AUD-only, few significant differences arose in the odds of psychosocial or health-related problems of those with AUD+CUD compared to those with CUD-only. These findings suggest that both AUD and CUD are associated with considerable psychosocial and health-related problems, in contradiction to the public's low risk perception of cannabis use (McGinty et al., 2017; Substance Abuse and Mental Health Services Administration, 2020). Moreover, among people who use alcohol and cannabis, AUD or CUD are markers of heavy, problematic use.

Although the prevalence of CUD among US adults is low, approximately 2.54% of this nationally representative sample met 2 or more criteria for DSM-5 CUD (Hasin et al., 2016). While CUD may be rare in the general population, it is not inconsequential, and

our findings suggest that people with CUD are at high risk of psychosocial and health-related problems. People with CUD had two to four times higher odds of interpersonal problems, financial, and legal problems compared with people who had no substance use disorder indicating that the problems associated with CUD are numerous and varied. CUD has been shown to influence multiple aspects of an individual's life, and interferes with his or her ability to perform social roles in both interpersonal or professional life (Hall, 2017). These results are consistent with literature regarding adverse psychosocial and behavioral consequences of cannabis use among adolescents,(Volkow et al., 2014) which could suggest that these problems persist into adulthood or that adults with CUD experience similar psychosocial problems within their social networks. Furthermore, previous research indicates that cannabis use and CUD also elevate the risk of substance induced psychosis (Hasin and Walsh, 2021; Marconi et al., 2016; Martinotti et al., 2021) and schizophrenia following substance induced psychosis (Marconi et al., 2016; Murrie et al., 2020). CUD has also been shown to be associated with mood disorders such as depression and bipolar I, although the directionality of the relationship and the association between CUD and mood disorders remains to be better understood (Hasin and Walsh, 2021). Future studies should examine whether CUD and co-occurring mental health disorders may operate synergistically to increase the odds of psychosocial, and health-related problems. For example, providing further information about psychosis following heavy cannabis use and/or subsequent CUD, or co-occurring mental health disorders should provide important information regarding the interpersonal, financial and legal problems associated with CUD found in our study that can lay the foundations for public awareness campaigns.

Popular beliefs hold that cannabis is less harmful than alcohol, although substance use disorders, regardless of the substance, imply a level of functional impairment. Despite the perception that cannabis use is harmless relative to alcohol, problems were consistent among respondents with AUD and CUD. For people with CUD, the odds of unemployment or interpersonal problems with a neighbor, relative, or friend were almost two times higher than those with AUD. Problems with employment may also reflect the differences in the legality of cannabis use compared with alcohol use (Hall, 2017), and the professional consequences of cannabis use. Employment and interpersonal problems may also be due to higher social acceptability and availability of alcohol compared with cannabis. Co-occurring AUD and CUD was also associated with substantially higher odds of problems relative to no substance use disorder. This is consistent with previous studies examining co-use of cannabis and alcohol in the US adult population, which showed that individuals who used both cannabis and alcohol had higher odds of social consequences such as legal, health, work and interpersonal problems compared with people who used alcohol-only (Subbaraman and Kerr, 2015; Yurasek et al., 2017). Given that cannabis is the most commonly used drug among individuals who drink and CUD is strongly associated with alcohol use (Hasin and Walsh, 2021; Williams and Hill, 2019), understanding how simultaneous alcohol and cannabis use disorders increase the odds of problems is an important direction for future work. Future studies should also re-examine this relationship in states with medical and recreational cannabis laws, which this would adjust for potential legal consequences of cannabis use and social acceptability.

This study should be considered within the context of three primary limitations that are consistent with all large-scale epidemiologic surveys on substance use. First, NESARC-III is a cross-sectional survey and therefore temporal relationships between alcohol/cannabis use disorder and associated adverse problems cannot be inferred. Although participants might have used either alcohol or cannabis following problems, our findings are consistent with longitudinal studies that have examined the adverse consequences of exposure to either substance individually (Babor and Alcohol and Public Policy Group, 2010; Dawson et al., 2008; Hall and Degenhardt, 2009; Hasin, 2018). Future prospective studies should compare the problems of people following the diagnosis of a use disorder. Second, past year self-reported alcohol or cannabis use disorder may be subject to social desirability and recall bias (Hasin et al., 2003). Given that non-medical cannabis use was only legal in two US states at the time of this survey (2012–2013), it is possible that cannabis use would be more sensitive to underreporting than alcohol use, which is legal in all US states (Garvey and Yeh, 2014). Future studies should determine if the state-level legal status of cannabis modifies the relationship with problems. Third, NESARC-III excluded institutionalized populations who have an increased probability of alcohol and cannabis use, (McCutcheon et al., 2009) so observed associations may be conservative. Despite these limitations, this study used a large sample of nationally representative US adults to make a compelling argument that neither alcohol nor cannabis use disorders are harmless compared with no substance use disorder, and with no evidence that CUD is any less harmful than AUD.

CONCLUSION

This is the first study to directly compare the burden of adverse interpersonal, financial, legal and health-related experiences among people with alcohol and cannabis use disorders. Our study finds that compared to persons who report neither AUD nor CUD, those with AUD-only, CUD-only or AUD+CUD had higher odds of psychosocial and health-related problems, and people with co-occurring disorders had greater odds of most psychosocial and health-related problems than those with AUD-only, although few differences arose when the AUD+CUD group was compared with the CUD-only group. Although most individuals that use cannabis recreationally do not experience harms, frequent cannabis use can result in CUD, and CUD does not appear to be a harmless alternative to AUD.

As cannabis becomes increasingly available through liberalizing cannabis laws, it is important to understand the experiences of people who use cannabis. Cannabis legalization increases availability and subsequently is likely to increase cannabis use and its attendant consequences such as CUD, similar to other legal substances, such as tobacco and alcohol (Degenhardt and Hall, 2012; Hall and Lynskey, 2016). Moreover, increased public acceptance and availability of cannabis could also lead to more combined alcohol and cannabis use disorders, which we found to be associated with the highest odds of all interpersonal, financial, legal and health-related problems. In summary, alcohol and cannabis use disorders pose the risk for problems across a range of domains, and represent important public health concerns.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Cannabis use and cannabis use disorder (CUD) are increasing in the USA
- Relations of CUD to psychosocial/health problems were evaluated and compared to AUD
- CUD was associated with interpersonal, financial, legal, and health problems
- CUD and AUD were associated with similar levels of psychosocial/health problems
- Co-occurring AUD+CUD was associated with greatest odds of all problems

Table 1:

Sociodemographic characteristics, overall sample, and among those with DSM-5 alcohol use disorder (AUD) and cannabis use disorder (CUD)

	12-month use disorder status									
	Whole sample (N=35,650)		No AUD or CUD (n=30,501; 85.8% [SE=.32])		AUD only (n=4,321; 12.0% [SE=.28])		CUD Only (n=343; 0.9% [SE=.05])		AUD and CUD (n=485; 1.3% [SE=.08])	
	n	% (SE)	n	% (SE)	n	% (SE)	n	% (SE)	n	% (SE)
Sociodemographic variable										
<i>Gender</i>										
Male	15538	48.03 (0.30)	12545	45.78 (0.33)	2459	60.60 (0.86)	225	66.61 (3.88)	309	67.74 (2.51)
Female	20112	51.97 (0.30)	17956	54.22 (0.33)	1862	39.40 (0.86)	118	33.39 (3.88)	176	32.26 (2.51)
<i>Age</i>										
18–29	7934	21.49 (0.37)	5890	18.08 (0.35)	1599	39.24 (0.97)	163	51.43 (3.09)	282	63.18 (2.99)
30–44	9944	25.66 (0.33)	8275	24.93 (0.34)	1422	30.79 (0.88)	114	30.09 (3.20)	133	23.26 (2.67)
45–64	12005	35.07 (0.32)	10714	36.79 (0.34)	1167	26.61 (0.90)	57	15.23 (2.33)	67	12.88 (1.87)
65+	5767	17.78 (0.37)	5622	20.20 (0.42)	133	3.35 (0.34)	9	3.24 (1.43)	3	0.68 (0.44)
<i>Race/ Ethnicity</i>										
White	18817	66.10 (0.77)	16109	66.13 (0.81)	2344	67.75 (1.06)	161	54.71 (3.38)	203	56.87 (2.79)
Black	7612	11.76 (0.66)	6449	11.62 (0.66)	891	11.01 (0.84)	111	21.81 (2.37)	161	21.47 (2.43)
Hispanic	6928	14.77 (0.68)	5956	14.79 (0.70)	822	14.35 (0.80)	54	16.29 (2.29)	96	15.76 (1.61)
Other	2293	7.37 (0.49)	1987	7.46 (0.49)	264	6.89 (0.65)	17	7.19 (2.55)	25	5.89 (1.39)
<i>Education level</i>										
Less than high school	5356	12.91 (0.42)	4679	13.23 (0.45)	538	10.20 (0.61)	71	19.31 (2.27)	68	12.21 (2.06)
High school	9602	25.67 (0.52)	8215	25.45 (0.56)	1138	26.44 (0.90)	105	31.70 (3.18)	144	28.92 (2.26)
More than high school	20692	61.42 (0.76)	17607	61.32 (0.81)	2645	63.36 (1.12)	167	48.99 (3.26)	273	58.87 (2.66)

N= number of people; SE= standard error

Note: Alcohol Use Disorder (AUD) and Cannabis Use Disorder (CUD) were defined by two or more use disorder DSM-5 criteria occurring in the past 12 months. People with any other substance use disorder in the past year (n=659) were excluded from the analytic sample.

Table 2:

Association between DSM-5 AUD and CUD and social and other problems (n = 35,650)

	Disorders compared to non-disorder reference group			Disorders compared to each other		
	AUD only vs. No AUD or CUD	CUD only vs. No AUD or CUD	AUD and CUD vs. No AUD or CUD	CUD only vs. AUD only	AUD and CUD vs. AUD only	AUD and CUD vs. CUD only
Past Year Problems	aOR^a (95% CI)	aOR^a (95% CI)	aOR^a (95% CI)	aOR^a (95% CI)	aOR^a (95% CI)	aOR^a (95% CI)
<i>Interpersonal Problems</i>						
Trouble with boss or co-workers	1.87 (1.67–2.09)	1.41 (1.00–2.00)	2.83 (2.09–3.84)	0.76 (0.52–1.10)	1.51 (1.10–2.09)	2.00 (1.31–3.05)
Problems with neighbor, relative, friend	2.04 (1.79–2.31)	3.97 (2.65–5.94)	3.72 (2.91–4.75)	1.95 (1.28–2.96)	1.83 (1.40–2.39)	0.94 (0.58–1.50)
Broke up major relationship	2.37 (2.13–2.64)	2.42 (1.61–3.64)	4.01 (2.94–5.47)	1.02 (0.66–1.57)	1.69 (1.23–2.32)	1.66 (1.03–2.67)
<i>Financial and Legal Problems</i>						
Fired or laid off	1.69 (1.46–1.95)	2.02 (1.37–2.99)	2.08 (1.53–2.83)	1.20 (0.83–1.73)	1.24 (0.90–1.70)	1.03 (0.66–1.61)
Unemployed	1.53 (1.38–1.70)	2.75 (2.12–3.57)	2.75 (2.15–3.52)	1.80 (1.40–2.32)	1.79 (1.40–2.31)	1.00 (0.70–1.43)
Homeless	2.78 (2.13–3.63)	4.26 (2.07–8.78)	4.28 (2.75–6.64)	1.53 (0.73–3.21)	1.54 (0.96–2.46)	1.00 (0.51–1.97)
Declared bankruptcy	1.04 (0.71–1.54)	1.28 (0.42–3.92)	1.66 (0.75–3.68)	1.22 (0.40–3.72)	1.59 (0.66–3.83)	1.30 (0.50–3.37)
So much debt couldn't repay	1.90 (1.71–2.10)	2.33 (1.55–3.52)	2.79 (2.25–3.46)	1.23 (0.82–1.85)	1.47 (1.18–1.83)	1.20 (0.76–1.89)
Trouble with law/police	3.34 (2.59–4.31)	3.62 (2.20–5.95)	7.71 (5.27–11.27)	1.08 (0.63–1.86)	2.31 (1.57–3.39)	2.13 (1.11–4.08)
<i>Health-related Problems</i>						
Hospitalized	1.13 (0.99–1.30)	0.79 (0.45–1.39)	1.92 (1.29–2.86)	0.70 (0.38–1.27)	1.70 (1.15–2.52)	2.43 (1.19–4.99)
Emergency treatment	1.29 (1.17–1.42)	1.74 (1.33–2.29)	1.92 (1.49–2.48)	1.35 (1.01–1.80)	1.49 (1.12–1.97)	1.10 (0.76–1.60)
Suicide attempt at current age	3.48 (1.60–7.59)	2.41 (0.31–18.74)	6.88 (2.48–19.04)	0.69 (0.06–7.66)	1.97 (0.56–6.92)	2.86 (0.53–15.45)

^aaOR= adjusted odds ratio; adjusted for age, sex, ethnicity/race, and education; 95% CI= 95% confidence interval. Note: Alcohol Use Disorder (AUD) and Cannabis Use Disorder (CUD) were defined by two or more use disorder DSM-5 criteria occurring in the past 12 months. Those with any other substance use disorder in the past year (n=659) were excluded from the analytic sample. Participants with missing responses an outcome were excluded for that analysis (range of missingness: 0.03%– 0.52%). The majority of missingness was among people with no AUD or CUD