Cannabis use among Norwegian university students: Gender differences, legalization support and use intentions, risk perceptions, and use disorder

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ABSTRACT

Aims: We explored past-year cannabis use and associated characteristics, focusing on legalization attitudes, use intentions, risk perceptions, and possible dependence among Norwegian university/college students.
Methods: We examined a nation-wide sample of Norwegian university/college students (N = 49,688; 67% female) who participated in the Students' Health and Wellbeing Study (SHoT-study) in 2018. Participants reported past-year substance use, support for cannabis legalization, intent to use cannabis if legal, and perceived risks of weekly use. Past-year cannabis use (including use frequency) was examined in relation to these indicators. Legalization support, use intentions, and risk perceptions were examined in relation to use and gender. Potential cannabis use disorder was assessed with the Cannabis Abuse Screening Test (CAST) and examined in relation to use frequency and gender.
Findings: Past-year use was reported by 15.3% (11.8% women; 22.9% men). Majority of current users (roughly 90%) used no more than 50 times past year, and 6% (3.8% women; 8.5% men) met CAST use disorder criteria. Legalization support, use intentions, and no/low risk perceptions were significantly associated with greater odds of use, and greater use frequency among current users in both crude and adjusted models. Legalization support (23.0%), use intentions (14.0%), and perceptions of no/low risk (29.2%) were also relatively common even among current non-users, especially men. Male gender and more frequent use were associated with greater CAST scores and greater odds of use disorder.
Conclusions: Cannabis use was relatively common in this student sample. In addition to targeting frequent use, interventions may focus on cannabis-related attitudes and risk perceptions among uncertain/uninformed students.

1. Introduction

Both cannabis use (Schulenberg et al., 2019; European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2019a; Odani et al., 2019; Jacob, 2015; Castillo-Carniglia et al., xxxx) and treatment demand for cannabis use disorders (Manthey, 2019; Montanari et al., 2017; Rush and Urbanoski, 2007) are on the rise globally, especially among young adults. As such, cannabis use remains a public health concern. College and university students may be at particular risk: not only are they likely to encounter opportunities to use cannabis as part of their college environments (Allen et al., 2017; Pinchevsky et al., 2012) and alter their attitudes and initiate use once in college (Pinchevsky et al., 2012;

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Stewart and Moreno, 2013), they are also likely to experience multiple adverse educational, health, and other consequences of such cannabis use, including dependence (Suerken et al., 2016; Bravo et al., 2019; Gunn et al., 2018; Arria et al., 2017; Martinez et al., 2015; Caldeira et al., 2012; Arria et al., 2015; Meda et al., 2017; Arria et al., 2016; Caldeira et al., 2008; Pearson et al., 2017). Cannabis use remains relatively common across campuses (Schulenberg et al., 2019; Arria et al., 2017; Pearson et al., 2017; Blavos et al., 2017; Patrick et al., 2019), and it may become even more so given that the perceptions of its normativeness are high among university students (Dempsey et al., 2016; Kollath-Cattano et al., 2020) and the perceptions of its harmfulness are declining among youth in general (Pacek et al., 2015; Burdzovic Andreas, 2019; Kilwein et al., 2020). Furthermore, this population of young adults may be particularly sensitive to the ongoing shifts in the legal status of cannabis in many jurisdictions (Miller et al., 2017; Kerr et al., 2018; Barker and Moreno, 2020; Wang et al., 2019; Jones et al., 2018; Alley et al., 2020), including the pending drug reform and the possibility of decriminalization of recreational cannabis use in Norway in the near future (Høring - Rusreform fra straff til hjelp, 2020). Thus, better understanding of the characteristics associated with cannabis use among young adults, and especially those attending college, is needed (Stone et al., 2012). This report aimed to examine such characteristics in a nation-wide sample of Norwegian college and university students, whose cannabis-use patterns, related attitudes and perceptions, and the extent of cannabis use disorders remain relatively understudied.

Past research has identified multiple risk factors for cannabis use in young adults; for example, cannabis use in college students tends to be greater among men and often accompanied by use of other substances, both licit and illicit (Patrick et al., 2019; Kollath-Cattano et al., 2020; Haardörfer et al., 2016). However, the current global trends of cannabis decriminalization and legalization require an additional focus on the young adults' political attitudes and risk perceptions concerning cannabis use. There is considerable evidence that those who perceive no major risks from cannabis use tend to engage in such activities (Burdzovic Andreas, 2019; Haardörfer et al., 2016; Grevenstein et al., 2015; Lopez-Quintero and Neumark, 2010; Pedersen et al., 2016; Piontek et al., 2013). To understand these correlates of cannabis use, major national monitoring tools such as the Monitoring the Future (MTF) in the USA, and the European School Project on Alcohol and Other Drugs (ESPAD) in the European Union, gather and examine information not only on underage substance use but also on related risk perceptions (Piontek et al., 2013; Johnston et al., 2017). However, there is no comparable coordinated effort when it comes to understanding legalization attitudes or intended use behaviors under legalization regimes, especially among young people. Limited research notes that, not surprisingly, those who support cannabis legalization also tend to be current and recent users themselves (Williams et al., 2016; Ellis et al., 2019), and that the intentions and/or expectations to use cannabis are increasingly common among adolescents and young adults, especially if recreational use were legal (Lopez-Quintero and Neumark, 2010; Palamar et al., 2014; Miech et al., 2015; Leung et al., 2020; Leal and Jackson, 2019). For example, sizable proportions of Australian adolescents (85%) and young adults (59%) who had never used cannabis expressed interest in trying or using cannabis in case of legalization (Leung et al., 2020).

These questions may be of timely relevance in Norway, where there is currently only a limited approval of medical cannabis and where the drug reform initiatives including decriminalization of recreational cannabis use for adults are currently deliberated (Høring - Rusreform fra straff til hjelp, 2020; Egnell et al., 2019). Also, even though the prevalence of past-year cannabis use in Norway remains well below the European Union average and is currently slightly under 10% among young adults between the ages of 16 and 35 in the general population (European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2019a, 2019b); more than 2 in 3 patients seeking treatment for cannabis use disorders in Norway are under 29 years of age (Christiansen and Bretteville-Jensen, 2018). In addition, the limited research on university

and college students in Norway revealed that their perceptions of cannabis harms diverge from those of the general population, such that students tend to perceive cannabis as less harmful than alcohol (Pedersen et al., 2016; Pedersen and Von Soest, 2015). Such students may therefore represent a sizeable segment of potential cannabis users, together with roughly 50% of the Norwegian 10th graders who perceive cannabis experimentation to be non-risky (Burdzovic Andreas, 2019). Further, comparable questions of political attitudes have been examined in relation to medical cannabis and in a general population (Sznitman and Bretteville-Jensen, 2015) but not in relation to recreational use and among college students in Norway. Finally, little is known about the extent and correlates of problematic cannabis use, including putative use disorders, in this segment of the Norwegian population.

In short, this report examined past-year cannabis use and associated characteristics among Norwegian college and university students, focusing on the role of cannabis-related legalization attitudes and use intentions, perceptions of risk, and possible dependence symptoms. The results may be informative for university-based intervention strategies addressing cannabis use within the context of rapidly changing legal framework.

2. Materials and Methods

2.1. Sample

We examined a nation-wide sample of the Norwegian college students who participated in the Students' Health and Wellbeing Study (SHoT-study) in 2018 (Sivertsen et al., 2019). The SHoT2018 study is a national student survey for higher education in Norway, initiated by the three largest student welfare organizations; Sammen (Bergen and surrounding area), Sit (Trondheim and surrounding area), and SiO (Oslo and Akershus). Data for the SHoT2018 was collected electronically through a web-based platform. Details of the study has been published elsewhere (Sivertsen et al., 2019), but in short, the SHoT2018 was conducted between February 6 and April 5, 2018, and invited all full-time Norwegian students between 18 and 35 years of age pursuing higher education (both in Norway and abroad). Of the 162,512 students who met the inclusion criteria and were invited to participate in SHoT in 2018, 50,054 completed online questionnaire (i.e., 31% response rate). Of these, 49,688 (99.3%) had valid responses on the cannabis module. This was our analytical sample.

2.2. Measures

Cannabis use: *Frequency of past-year cannabis use* was measured with a single question "How often did you use cannabis in the past 12 months?", with binned categories of "never", "1 time", "2–4 times", "5–50 times", "more than 50 times", and "daily" as the response options. For analytical purposes, these were recoded to reflect: a) any use vs. none, and b) less frequent (between 1- and 50-times past year) and more frequent use (more than 50 times, including daily use) among users only. These categories roughly correspond to up to weekly use (i.e., ≤ 50 times past year) and weekly or more frequent use (i.e., > 50 times). Those who reported cannabis use in the past year are referred in text as "current users".

Demographics: Participants reported their *gender* and *age*, which was categorized into three groups, "18–20", "21–25", and "26 and older". Those who reported that they themselves or at least one parent were born abroad were classified as having *immigrant background*.

Other substance use: *Current alcohol use* was assessed with a single question "How often do you drink alcohol?", with the response options formatted into binned categories of "never", "monthly or less frequently", "2–4 times/month", "2–3 times/week", and "4 times/week or more frequently". Because only 617 (1.24%) participants reported drinking 4 times/week or more often, the two upper categories were combined into a "2–3 times/week or more frequently" category. *Current*

smoking was assessed with a single question "Do you smoke?", with the response options of "no", "yes, occasionally", and "yes, daily"". Finally, participants reported whether or not (yes/no) they had ever tried any illicit drug(s) other than cannabis.

<u>Legalization attitudes and risk perceptions</u>: Cannabis-related attitudes were assessed with two questions: 1. "Do you think cannabis use should be legal for individuals over 18?" and 2. "Would you use cannabis if it were legal?," with "yes", "no", and "don't know" response options for both items. Participants also reported to what degree they think people risk harming themselves physically or otherwise if they use cannabis once or twice every week. The original response categories of "no risk" and "low risk" were combined into a single category, as were the "moderate" and "large" risk categories to reflect *perceived harmfulness of weekly cannabis use*. Responses of "don't know" were retained and modeled as a separate category.

<u>Cannabis use disorder</u>: The Cannabis Abuse Screening Test (CAST) was administered only to those participants who reported any past-year cannabis use (Legleye, 2018). CAST was shown to successfully screen for problematic cannabis use in general populations and among young people, and was validated against the two most recent versions of the Diagnostic and Statistical Manual of Mental Disorders (DSM) internationally, but not in Norway so far (Legleye et al., 2013; Cuenca-Royo et al., 2012). Importantly, CAST does not include assessments of cannabis use frequency but instead focuses on problematic use broadly defined (i.e., memory problems, using alone, etc.) where the responses to the 6 CAST items are provided on a 5-point scale ranging from 0 "never" to 4 "very often" yielding a full scale sum score with the possible range of 0–24. We have examined past-year cannabis users from our sample both in terms of continuous CAST scale scores and dichotomized categories where the sum scale scores equal or greater than 7 meet the $DSM-5$ criteria for moderate/severe cannabis addiction as evidenced in recent international reports (Legleye, 2018; Cuenca-Royo et al., 2012).

2.3. Analyses

Cannabis use during past year was examined as a function of demographic-, substance use-, and cannabis-related attitudes and risk perceptions characteristics. We examined both the risk of any use among all participants, and the risk of frequent use (i.e., 50 times or more) among past-year users. Distributions and crude and adjusted associations of these cannabis use categories with risk factors were examined using basic tests of associations and logistic regression models. Putative differences in legalization attitudes, use intentions, and risk perceptions were examined as a function of use vs. non-use and gender (using multinomial regression), while CAST scores and clinical-level symptomatology were examined as a function of use frequency and gender using unadjusted measures of association (i.e., t-tests, Chi-square tests, and logistic regressions).

Given that the number of missing responses on each individual predictor was negligible – ranging from 1.9% to 0.07% on the reports of current smoking and drinking respectively – no advanced missing data or imputation procedures were used. However, this approach resulted in varied sample sizes across univariate models, and an overall smaller analytical sample in our multivariable models. All analyses were performed using Stata v. 15 (StataCorp, 2017).

3. Results

3.1. Cannabis use among Norwegian students

Past-year prevalence of cannabis use was 15.3% ($n = 7,575$). Among current users, 9.1% reported having used cannabis more than 50 times, including daily, in the past year.

Table 1 summarizes all study variables and notes their associations with past-year cannabis use, both for any use versus non-use (entire

Table 1

Past year cannabis use across demographic-, substance use-, and legalization attitudes and risk perceptions characteristics; shown are distributions for a. any use vs. non-use (entire sample; N = 49,688) and b. more vs. less frequent use among current users only ($n = 7,575$).

Variables	*a. Entire sample* (N = 49,688)		*b. Current users only* (n = 7,575)	
	Valid cases (entire sample)	Any use vs. no use (n = 7,575)	*Valid cases (current users only)*	More vs. less frequent use (n = 692)
Demographic characteristics	*n (%)*	%	*n (%)*	%
Gender				
Female	34,243 (69.2%)	11.8% [a]	4,041 (53.7%)	5.4% [a]
Male	15,251 (30.8%)	22.9% [a]	3,488 (46.9%)	13.3% [a]
Age				
18–20	8,765 (17.9%)	13.0% [a]	1,138 (15.2%)	7.1% [a, b]
21–25	21,187 (63.6%)	16.1% [a]	5,033 (67.3%)	9.2% [a]
26 +	9,058 (18.5%)	14.4% [a]	1,305 (17.5%)	11.0% [b]
Immigrant background				
No	41,879 (84.6%)	14.6% [a]	6,129 (81.2%)	8.8% [a]
Yes	7,639 (15.4%)	18.6% [a]	1,422 (18.8%)	10.8% [a]
Substance use characteristics	*n (%)*	%	*n (%)*	%
Current smoker				
No	43,797 (89.8%)	11.7% [a, b]	5,129 (69.2%)	4.2% [a, b]
Occasional	4,146 (8.5%)	46.2% [a]	1,916 (25.9%)	17.8% [a]
Daily	806 (1.7%)	44.8% [b]	361 (4.9%)	34.9% [b]
Current alcohol use				
None	3,949 (8.0%)	2.7 [a]	107 (1.4%)	13.1% [a]
Once per month or less	15,911 (32.0%)	8.2 [a]	1,295 (17.1%)	11.6% [a]
2–4 times/month	22,322 (45.0%)	17.1 [a]	3,823 (50.5%)	8.3% [a]
2–3 times/week or more	7,472 (15.0%)	31.4 [a]	2,344 (31.0%)	8.9% [a]
Tried any other drug				
No	42,920 (86.4%)	5.9% [a]	2,516 (33.2%)	4.2% [a]
Yes	6,768 (13.6%)	74.8% [a]	5,059 (66.8%)	11.6% [a]
Attitudes and Perceptions	*n (%)*	%	*n (%)*	%
Legalization support				
Yes	11,610 (23.4%)	38.6 [a]	4,477 (59.2%)	13.6% [a]
No	24,596 (49.6%)	5.3 [a]	1,314 (17.4%)	2.4% [a]
Don't know	12,298 (27.0%)	13.3 [a]	1,775 (23.4%)	3.1% [a]
Intended use if legalized				
Yes	6,916 (14.0%)	53.7% [a]	3,713 (49.1%)	17.0% [a]
No	32,120 (64.7%)	5.5% [a]	1,763 (23.3%)	0.9% [a]
Don't know	10,582 (21.3%)	19.7% [a]	2,086 (27.6%)	2.2% [a]
Perceived risk from weekly use				
None/Low	14,455 (29.1%)	32.1% [a]	4,643 (61.3%)	12.8% [a]
Moderate/Large	26,181 (52.8%)	10.0% [a]	2,624 (34.7%)	3.5% [a]

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Table 1 (*continued*)

Variables	a. Entire sample (N = 49,688)		b. Current users only (n = 7,575)	
	Valid cases (entire sample)	Any use vs. no use (n = 7,575)	*Valid cases (current users only)*	More vs. less frequent use (n = 692)
Don't know	8,973 (18.1%)	3.4% [a]	301 (4.0%)	2.3% [a]

Note:

Shown are the proportions (%) of: a) past-year cannabis users vs. non-users in the entire student sample and b) frequent users (i.e., using 50 times or more up to daily) vs. less frequent user in the sub-sample of current cannabis users as a function of all predictors.

For example, 11.8% of women and 22.9% of men from our sample reported any cannabis use in the past 12 months; among those current users, 5.3% of women and 13.3% of men reported using more than 50 times (i.e., using more frequently) in the past 12 months.

Noted are also the significant differences obtained from crude logistic regression models for: a) any use vs. non-use in the entire sample, and b) more vs. less frequent use in the sub-sample of current users. For example, the above-noted gender differences translate into: a) more than twice as greater odds of cannabis use in the past 12 months for men than for women (22.9% vs. 11.8%; OR = 2.21, 95% CI = 2.1–2.3, $p < .001$), and b) more than two and a half greater odds of using 50 or more times for men than for women users (13.3% vs. 5.3%; OR = 2.67, 95% CI = 2.6–3.2, $p < .001$). Specifically, shared superscripts indicate significant differences across denoted categories/groups at $p < 0.05$ or lower.

The results from these univariable models are available upon request.

sample; Column 2) and for more versus less frequent use (sub-sample of current users only; Column 3). In terms of demographics, past-year cannabis use was more common among men (11.8% women vs. 22.9% men), among 21–25 years old group (vs. both younger and older students), and among students with immigrant background. In terms of substance use characteristics, past-year cannabis use was more common among smokers (vs. non-smokers); among current drinkers (vs. non-drinkers); and among those who have ever tried illicit drugs other than cannabis. In terms of legalization attitudes and risk perceptions, past-year cannabis use was more common among those explicitly endorsing cannabis legalization (vs. those who oppose it or are unsure); among those who would use cannabis if legal (vs. those who would not or are unsure), and among those who perceive weekly cannabis use to carry no or low risk (vs. those who see it as risky it or are unsure). The results for frequency of use in the current user sub-sample follow similar patterns as observed for any use, except for age (where the greater proportion of those older than 26 used cannabis more than 50 times), current smoking (where the greater proportion of daily smokers used cannabis more than 50 times), and alcohol use (where the greater proportion of no or low frequent drinkers used cannabis more than 50 times).

Most of these associations remained significant in our multivariate models. Table 2 shows the estimates from the multivariable logistic regression model estimating the odds of any past-year cannabis use in the entire sample (Column 1) and of more frequent use in the sub-sample of current users (Column 2) as a function of all study variables. Odds of any cannabis use were significantly greater for men than for women, as was the frequency of use once they used. While older age (26 or older) was associated with lower odds of any cannabis use, being between 21 and 25 years of age was associated with more frequent use compared to the youngest age (between 18 and 20 years old) among current users. Immigrant background was not associated with the risk of any cannabis use, or with greater use frequency among current users.

In terms of other substance use, any current experience with smoking or drinking, or any lifetime use of other illicit substances were associated with at least doubled (or greater) risk of any cannabis use in the past

Table 2

Likelihoods of past-year cannabis use as a function of demographic-, substance use-, and legalization attitudes and risk perceptions characteristics.

Variables	Past-year cannabis use	
	a. Any use (entire sample; n = 47,569)	b. More frequent use (current users only; n = 7,232)
Demographic characteristics	**aOR (95% CI)**	**aOR (95% CI)**
Gender (male)	1.09 (1.01–1.18)*	**2.09 (1.73–2.54)*****
Age		
18–20	ref.	ref.
21–25	1.05 (0.95–1.17)	1.37 (1.04–1.80)*
26 +	0.69 (0.61 - 0.78)***	1.34 (0.97–1.85)
Immigrant background	1.10 (0.99–1.21)	1.14 (0.92–1.43)
Substance use characteristics	**aOR (95% CI)**	**aOR (95% CI)**
Current smoker		
No	ref.	ref.
Occasional	2.39 (2.16–2.65)***	4.42 (3.62–5.38)***
Daily	2.47 (1.96–3.11)***	11.28 (8.38–15.18)***
Current alcohol use		
Never	ref.	ref.
Once per month or less	2.05 (1.57–2.67)***	0.96 (0.47–1.93)
2–4 times/month	3.71 (2.86–4.80)***	0.31 (0.67–1.26)
2–3 times/week or more	5.40 (4.14–7.02)***	0.49 (0.24 - 0.99)*
Tried any other drug	30.0 (27.7–32.5)***	2.71 (2.13–3.43)***
Attitudes and Perceptions	**aOR (95% CI)**	**aOR (95% CI)**
Legalization support		
No	ref.	ref.
Yes	2.27 (2.02–2.54)***	1.57 (1.03–2.38)*
Don't know	1.46 (1.57–2.67)***	0.84 (0.51 – 1.37)
Intended use if legalized		
No	ref.	ref.
Yes	5.75 (5.18–6.39)***	13.9 (7.86–24.4)***
Don't know	2.30 (2.08–2.53)***	2.32 (1.23–4.38)***
Perceived risks from weekly use		
None/Low	ref.	ref.
Moderate/Large	0.78 (0.72 - 0.86)***	0.52 (0.40 - 0.67)***
Don't know	0.35 (0.30 - 0.41)***	0.59 (0.26–1.14)

Note:

* $p < .05$; ** $p < .01$; *** $p < .001$.

Shown are the estimates from the multivariable logistic regression models estimating the odds of: a) any past-year cannabis use vs. non-use in the entire sample ($n = 47,569$), and b) of higher vs. lower frequency of use in the sub-sample of current users ($n = 7,232$) as a function of all shown variables. Use frequency reflected less frequent use (≤ 50 times) and more frequent use (> 50 times, up to daily use) in the past year.

year. Among current users, current smoking and any lifetime use of other illicit drugs remained significantly associated with greater use frequency as well; however, current alcohol use was largely not associated with using cannabis more than 50 times, and drinking often (2–3 times/week or more) was associated with lower odds of using more than 50 times. Explicit support of cannabis legalization, as well as the still undecided views on this issue were associated with increased risk of any use, while only the direct support for legalization was associated with using more than 50 times among current users. Explicit intentions to use cannabis in case of legalization, as well as the undecided views on this issue, were associated with greater risk of any use among all students, and of using more than 50 times among current users. Finally, perceptions of moderate/large risk stemming from weekly cannabis use were associated with significantly lower risk of any use among all students, as well as of using more than 50 times among current users. Uncertainty of such risks was associated with decreased odds of any use only in the entire sample.

Table 3

Cannabis legalization attitudes and risk perceptions; current users vs. non-users and gender differences; entire sample (N = 49,688).

Past-year cannabis use	Legalization attitudes and risk perceptions		
	a. Legalization support		
	Yes	No	Don't know
Non-users	16.9%	55.3%	27.6%
Men	*31.0%*	*41.5%*	*27.3%*
Women	*11.4%*	*60.7%*	*27.7%*
Users	59.1%	17.4%	23.4%
Men	*72.6%*	*10.9%*	*16.4%*
Women	*47.3%*	*23.0%*	*29.6%*
	b. Intended use if legalized		
	Yes	No	Don't know
Non-users	7.6%	72.1%	20.2%
Men	*13.2%*	*60.9%*	*25.7%*
Women	*5.4%*	*76.5%*	*18.0%*
Users	49.0%	23.3%	27.5%
Men	*56.9%*	*18.6%*	*24.3%*
Women	*42.2%*	*27.2%*	*30.4%*
	c. Perceived risk from weekly use		
	No/low risk	Moderate/high risk	Don't know
Non-users	23.3%	55.9%	20.6%
Men	*40.9%*	*42.1%*	*16.9%*
Women	*16.4%*	*61.4%*	*22.0%*
Users	61.3%	34.6%	4.0%
Men	*74.2%*	*23.1%*	*2.6%*
Women	*50.0%*	*44.7%*	*5.2%*

Shown are the unadjusted proportions (%) of participants endorsing each option for: a) legalization of cannabis, b) intended use in case of legalization, and c) perceptions of risk associated with weekly cannabis use for users vs. non-users, and for men vs. women. Differences in these proportions were tested by multinomial regression models estimating the likelihoods of cannabis legalization attitudes, intentions to use in case of legalization, and risk perceptions as a function of gender, past year cannabis use (yes/no), and their interaction.

In all three models, there were main effects of current use vs. non-use (such that current users were more likely to endorse or be unsure of cannabis legalization; more likely to state intended use or be unsure about it; and less likely to perceive moderate/high risk from weekly cannabis use or be unsure about it than current non-users); gender (such that men were more likely to endorse or be unsure of cannabis legalization; more likely to state intended use or be unsure about it; and less likely to perceive moderate/high risk from weekly cannabis use or be unsure about it than women); and use X gender interaction effects (except for the "don't know" category in the risk perceptions model).

All above noted significant main and interaction effects were significant at $p <$ .01 or below. The complete results from these multinomial models are available upon request.

3.2. Legalization attitudes, use intentions, and perceptions of risk from weekly cannabis use

Table 3 shows the proportions (%) of participants endorsing each option for a) legalization of cannabis, b) intended use in case of legalization, and c) perceptions of risk associated with weekly cannabis use, as reported by current users vs. non-users, and men vs. women. While 6 in 10 of current users favored cannabis legalization and 5 in 10 intended to use in case of legalization, such endorsements were evident among current non-users as well (16.9%, and 7.6%, respectively). However, these estimates were almost entirely driven by men, such that almost three times as many currently non-using men than women endorsed legalization (31.0% men vs. 11.4% women) and planned to use cannabis if legalized (13.2% vs. 5.4% women). Similar trends were observed for risk perceptions, such that 40.9% of the currently non-using men perceived no or low risk from weekly cannabis use vs. only 16.4% of currently non-using women.

In all examined indicators, the proportions of respondents without strongly differentiated legalization attitudes and risk perceptions were sizeable. In particular, the proportion of non-users who remained unsure and responded "don't know" on these items ranged from 20.2% (for use intentions in case of legalization) to 26.7% (for legalization support).

Table 4

CAST characteristics of current users; use frequency and gender differences (*n* = 7,549).

Frequency of past year cannabis use, current users only	Valid cases	CAST	
		a. Scale score	b. Clinical-range
	n (%)	M (SD)	%
Entire sample	*7,549 (100.0%)*	*1.40 (2.66)*	*5.96%*
Less frequent use (≤50 times)	6,857 (90.8%)	0.86 (1.74)***	1.87%
More frequent use (>50 times)	692 (9.2%)	6.8 (3.86)***	46.53%
Men	*3,481 (100%)*	*1.83 (3.05)*	*8.45%*
Less frequent use (≤50 times)	3,016 (86.6%)	1.05 (1.95)***	2.42%
More frequent use (>50 times)	465 (13.4%)	6.95 (3.83)***	47.53%
Women	*4,022 (100%)*	*1.02 (2.17)*	*3.75%*
Less frequent use (≤50 times)	3,802 (94.5%)	0.71 (1.54)***	1.39%
More frequent use (>50 times)	220 (5.5%)	6.48 (3.73)***	44.55%

Note:

* $p < .05$; ** $p < .01$; *** $p < .001$.

Even though a total of 7,575 participants reported past year cannabis-use, only 7,549 completed CAST.

Shown are the unadjusted estimates; average CAST scores and the proportion of respondents scoring within DSM-5 clinical range for use disorder among past-year cannabis users for the two examined use frequency categories.

Noted are significant differences across past-year use frequency categories obtained from: a) t-tests for CAST continuous scale scores; $t(7,547) = -73.3$, $p < .001$ for all users; $t(3,479) = -51.7$, $p < .001$ for men, and $t(4,020) = -47.9$, $p < .001$, for women, and b) Chi-square tests for the distribution of DSM-5 clinical cases, exact $X^2(1) = 2,200$, $p < .001$ for all users; exact $X^2(1) = 1,100$, $p < .001$ for men, and exact $X^2(1) = 1,100$, $p < .001$ for women.

Overall, men had both significantly greater average CAST scores ($M_{Men} = 1.83 \pm 3.05$ vs. $M_{Women} = 1.02 \pm 2.17$; $t(7,501) = -13.3$, $p < .001$) and greater odds of use disorder (8.45% vs. 3.75%, OR = 2.36, CI 95% = 1.93–2.89, $p < .001$).

3.3. CAST scores and potential cannabis use disorder

Table 4 shows CAST unadjusted estimates – both the average CAST scale scores, and the proportion of cases above the clinical cut-off – across the two use frequency groups and across gender. About 6% of all current cannabis users had CAST scores within the DSM-5 diagnostic range; about 2% of those who used no more than 50 times, and almost half (46.5%) of those who used more than 50 times did so. Both the average CAST scores and the proportion above the clinical-cut off differed significantly across the two use-frequency groups; these differences were statistically significant both within the entire sample, and for men and women (Table 4).

Again, based on the unadjusted estimates, men had both significantly greater average CAST scores ($M_{Men} = 1.83 + 3.05$ vs. $M_{Women} = 1.02 + 2.17$; $t(7,501) = -13.3$, $p < .001$) and greater odds of use disorder (8.45% vs. 3.75%; OR = 2.36, CI 95% = 1.93–2.89, $p < .001$).

4. Discussion/conclusion

This report examined past-year cannabis use and associated characteristics in a large, nation-wide sample of Norwegian university and college students. This was the first study to focus on current cannabis use in this population in relation to cannabis-related political attitudes, use intentions, risk perceptions, and dependence symptoms. The results thus provide important and timely information to the Student welfare association's and public health services, as well as to the policymakers currently deliberating drug reform in Norway.

Past year cannabis use was fairly common in this sample of

Norwegian college and university students, such that its prevalence exceeded the current national estimates of past-year cannabis use among young adults by about 50% (European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), 2019b) and such that 9.1% of current users reported use frequencies corresponding to weekly or daily use (i.e., used more than 50 times during previous year, including daily use). The results from univariable models show that past-year cannabis use was more common among men, students between 20 and 26 years of age, those with immigrant background, those currently engaging in alcohol and tobacco use, those with any history of illicit substance use, and those holding favorable cannabis legalization attitudes and perceptions of low risk. In terms of use frequency among current users, the results from univariable models show similar associations except for current alcohol use, where cannabis was used more frequently among those who drank less frequently. The results from our multivariable models were comparable to the results from the corresponding univariable models, except that immigrant background was no longer significantly associated with the risk of any use, or of more frequent use among current users. Overall, our results echo a set of demographic and behavioral characteristics associated with cannabis use among college and university students in previous studies, including male gender, smoking, and use of other illicit substances (Patrick et al., 2019; Kollath-Cattano et al., 2020; Haardörfer et al., 2016).

Additional probing of student responses concerning legalization attitudes, intentions to use cannabis if legalized, and risk perceptions revealed that the associations between such attitudes and cannabis use were primarily driven by current users. However, considerable proportions of students – including current non-users – reported being unsure, and as such, they may represent the most vulnerable group for future use. For example, among current non-users, 7.6% admitted they would use cannabis if it were legal, while another 20% were unsure (i.e., they did not respond with a categorical "no" but with "don't know"). That is, in addition to the 7.6% of current non-users who unambiguously declared they would use cannabis in case of legalization, another 1 in 5 may consider doing so given their expressed ambivalence. Similarly, among current non-users, 23.3% perceived weekly cannabis use to be non-risky, and an additional 20.6% admitted they did not know how risky such use may be. That means that almost half of the current non-users may consider using cannabis even under the current legal framework, given their expressed perceptions of low or unclear risks associated with weekly use. Together, these students represent a sizeable pool of potential cannabis users under more liberal cannabis legalization policies and cannabis normalization messages embedded – directly or indirectly – in such policies and debates (Leung et al., 2020). As such, these students may be of particular interest to university-based intervention strategies and policymakers alike. Specifically, these findings indicate that there may be preventive benefits of investing in increased awareness about the potential risks associated with cannabis use.

Finally, about 6% of all past-year users scored within DSM-5 clinical range on CAST measure; men had more than doubled odds of such classification than women. As expected from previous studies, frequency of use was associated with increased dependence risk (Gunn et al., 2020); in our sample, DSM-5 use disorder as assessed by CAST was evident in almost half of the students who used cannabis more than 50 times during previous year.

4.1. Strengths and limitations

The hereby reported results should be understood within the known limitations of cross-sectional designs and the relatively low response rate of the SHoT-sample (Sivertsen et al., 2019). Nevertheless, these issues do not necessarily impede inferences concerning the associations between the examined outcome (i.e., cannabis use) and putative risks (Nilsen et al., 2009; Rothman et al., 2013), as the original SHoT-study aims did not necessarily include population-level prevalence estimates. Next, the SHoT questionnaire does not differentiate between the

medical vs. recreational cannabis use in its legalization opinion item, nor does the questionnaire fully capture the participants' lifetime substance use history. Thus, it is possible that some of the students who reported no cannabis use in the past year had done so previously and that their legalization attitudes and risk perceptions were colored by such, albeit unknown, use histories and experiences. How the hereby reported results may be affected, if at all, by such students is not known. Further, our estimates of cannabis use disorder were based on the conservative CAST cut-offs, thus possibly under-estimating the extent of such clinical-level problems among current student users. Specifically, this measure has not been validated in Norway and some studies have identified much lower clinical cut-offs for moderate/severe dependence among adolescents (Legleye et al., 2013). Nevertheless, given the observed response rate and the possible over-representation of students with lesser substance use and behavioral problems – for example, as women were over-represented in the sample – these results can be cautiously understood as a conservative, lower-bound estimate of the extent of cannabis use and the related issues in the Norwegian university and college student population. Finally, this nation-wide large sample and its geographical representation add both robustness and utility to the obtained results, and substantively complement previous SHoT reports on substance use and health outcomes (Knapstad et al., 2019; Castillo-Carniglia et al., Heradstveit et al., xxxx; Heradstveit et al., 2020).

4.2. Conclusions

This is the first study to systematically examine cannabis use among Norwegian college and university students, including their cannabis-related political attitudes, risk perceptions, and potential use disorder. Cannabis use was relatively common, as were the positive legalization attitudes, use intentions in case of legalization, and low risk perceptions, especially among male users. Potential cannabis use disorder was also evident in 6% of current users, and was largely a function of weekly or more frequent cannabis use. Cannabis use thus represents a tangible health concern among Norwegian college and university students, which may further increase given the non-negligible representation of admittedly unclear risk perceptions and uncertain use intentions even among the current non-users. Thus, in addition to frequent use, campus-based intervention strategies may benefit from targeting students' cannabis-related attitudes and risk perceptions. In particular, students without firmly formed attitudes and risk perceptions may need tailored interventions, as they are both numerous and potentially vulnerable for future cannabis use.

Statement of ethics

The SHoT2018 study was approved by the Regional Committee for Medical and Health Research Ethics in Western Norway (no. 2017/1176). Informed consent was obtained electronically after the participants had received a detailed introduction to the study.

Author contributions

JBA: Literature review, conceptualization of research questions, data analysis, manuscript preparation and writing.

BS: Conception and design of the SHOT2018 study, and critical revision of the manuscript for important intellectual content.

KJL: Conception and design of the SHOT2018 study, obtaining funding, and critical revision of the manuscript for important intellectual content.

JCS: Input on research questions and data analysis, interpretation of results, critical revision of the manuscript for important intellectual content.

All authors have read and approved final submission.

Declaration of Competing Interest

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References

Schulenberg J. E., Johnston L. D., O'Malley P. M., Bachman J. G., Miech R. A., Patrick M. E. Monitoring the Future national survey results on drug use, 1975–2018: Volume II, College students and adults ages 19–60, Ann Arbor: Institute for Social Research, The University of Michigan: ; 2019.

European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). (2019a). European Drug Report 2019: Trends and Developments, Publications Office of the European Union, Luxembourg.

Odani, S., Soura, B. D., Tynan, M. A., Lavinghouze, R., King, B. A., & Agaku, I. (2019). Tobacco and Marijuana Use Among US College and Noncollege Young Adults, 2002–2016. *Pediatrics, 144*. e20191372.

Jacob, J. A. (2015). Marijuana Use Has Doubled Among US Adults. *JAMA, 314*, 2607-2607.

Castillo-Carniglia A., Rivera-Aguirre A., Calvo E., Queirolo R., Keyes K. M., Cerdá M. Trends in marijuana use in two Latin American countries: an age, period and cohort study, Addiction: n/a.

Manthey, J. (2019). Cannabis use in Europe: Current trends and public health concerns. *International Journal of Drug Policy, 68*, 93–96.

Montanari, L., Guarita, B., Mounteney, J., Zipfel, N., & Simon, R. (2017). Cannabis Use among People Entering Drug Treatment in Europe: A Growing Phenomenon? *European Addiction Research, 23*, 113–121.

Rush, B., & Urbanoski, K. (2007). Estimating the Demand for Treatment for Cannabis-related Problems in Canada. *International Journal of Mental Health and Addiction, 5*, 181–186.

Allen, H. K., Caldeira, K. M., Bugbee, B. A., Vincent, K. B., O'Grady, K. E., & Arria, A. M. (2017). Drug involvement during and after college: Estimates of opportunity and use given opportunity. *Drug and alcohol dependence, 174*, 150–157.

Pinchevsky, G. M., Arria, A. M., Caldeira, K. M., Garnier-Dykstra, L. M., Vincent, K. B., & O'Grady, K. E. (2012). Marijuana exposure opportunity and initiation during college: Parent and peer influences. *Prevention science : The official journal of the Society for Prevention Research, 13*, 43–54.

Stewart, M. W., & Moreno, M. A. (2013). Changes in Attitudes, Intentions, and Behaviors toward Tobacco and Marijuana during U.S. Students' First Year of College. *Tobacco Use Insights, 6*. TUI.S11325.

Suerken, C. K., Reboussin, B. A., Egan, K. L., Sutfin, E. L., Wagoner, K. G., Spangler, J., & Wolfson, M. (2016). Marijuana use trajectories and academic outcomes among college students. *Drug and Alcohol Dependence, 162*, 137–145.

Bravo A. J., Pearson M. R., Pilatti A., Mezquita L., Team C.-C. A. S. Negative marijuana-related consequences among college students in five countries: measurement invariance of the Brief Marijuana Consequences Questionnaire, Addiction 2019: 114: 1854-1865.

Gunn, R. L., Norris, A. L., Sokolovsky, A., Micalizzi, L., Merrill, J. E., & Barnett, N. P. (2018). Marijuana use is associated with alcohol use and consequences across the first 2 years of college. *Psychology of Addictive Behaviors, 32*, 885–894.

Arria, A. M., Caldeira, K. M., Allen, H. K., Bugbee, B. A., Vincent, K. B., & O'Grady, K. E. (2017). Prevalence and incidence of drug use among college students: An 8-year longitudinal analysis. *The American Journal of Drug and Alcohol Abuse, 43*, 711–718.

Martinez, J. A., Roth, M. G., Johnson, D. N., & Jones, J. A. (2015). How Robustly Does Cannabis Use Associate to College Grades? Findings From Two Cohorts. *Journal of Drug Education, 45*, 56–67.

Caldeira, K. M., O'Grady, K. E., Vincent, K. B., & Arria, A. M. (2012). Marijuana use trajectories during the post-college transition: Health outcomes in young adulthood. *Drug and alcohol dependence, 125*, 267–275.

Arria, A. M., Caldeira, K. M., Bugbee, B. A., Vincent, K. B., & O'Grady, K. E. (2015). The academic consequences of marijuana use during college. *Psychology of addictive behaviors : journal of the Society of Psychologists in Addictive Behaviors, 29*, 564–575.

Meda, S. A., Gueorguieva, R. V., Pittman, B., Rosen, R. R., Aslanzadeh, F., Tennen, H., … Pearlson, G. D. (2017). Longitudinal influence of alcohol and marijuana use on academic performance in college students. *PLoS ONE, 12*, Article e0172213.

Arria, A. M., Caldeira, K. M., Bugbee, B. A., Vincent, K. B., & O'Grady, K. E. (2016). Marijuana use trajectories during college predict health outcomes nine years post-matriculation. *Drug and alcohol dependence, 159*, 158–165.

Caldeira, K. M., Arria, A. M., O'Grady, K. E., Vincent, K. B., & Wish, E. D. (2008). The occurrence of cannabis use disorders and other cannabis-related problems among first-year college students. *Addictive behaviors, 33*, 397–411.

Pearson, M. R., Liese, B. S., & Dvorak, R. D. (2017). College student marijuana involvement: Perceptions, use, and consequences across 11 college campuses. *Addictive Behaviors, 66*, 83–89.

Blavos, A. A., Glassman, T. J., Sheu, J.-J., Thompson, A., DeNardo, F., & Diehr, A. J. (2017). Marijuana and College Students: A Critical Review of the Literature. *American Journal of Health Education, 48*, 167–184.

Patrick, M. E., Terry-McElrath, Y. M., Lee, C. M., & Schulenberg, J. E. (2019). Simultaneous alcohol and marijuana use among underage young adults in the United States. *Addictive Behaviors, 88*, 77–81.

Dempsey, R. C., McAlaney, J., Helmer, S. M., Pischke, C. R., Akvardar, Y., Bewick, B. M., … Mikolajczyk, R. T. (2016). Normative Perceptions of Cannabis Use Among European University Students: Associations of Perceived Peer Use and Peer Attitudes With Personal Use and Attitudes. *Journal of Studies on Alcohol and Drugs, 77*, 740–748.

Kollath-Cattano, C., Hatteberg, S. J., & Kooper, A. (2020). Illicit drug use among college students: The role of social norms and risk perceptions. *Addictive Behaviors, 105*, Article 106289.

Pacek, L. R., Mauro, P. M., & Martins, S. S. (2015). Perceived risk of regular cannabis use in the United States from 2002 to 2012: Differences by sex, age, and race/ethnicity. *Drug and alcohol dependence, 149*, 232–244.

Burdzovic Andreas, J. (2019). Perceived harmfulness of various alcohol- and cannabis use modes: Secular trends, differences, and associations with actual substance use behaviors among Norwegian adolescents, 2007–2015. *Drug and Alcohol Dependence, 197*, 280–287.

Kilwein, T. M., Wedell, E., Herchenroeder, L., Bravo, A. J., & Looby, A. (2020). A qualitative examination of college students' perceptions of cannabis: Insights into the normalization of cannabis use on a college campus. *Journal of American College Health*, 1–9.

Miller, A. M., Rosenman, R., & Cowan, B. W. (2017). Recreational marijuana legalization and college student use: Early evidence. *SSM - Population Health, 3*, 649–657.

Kerr, D. C. R., Bae, H., & Koval, A. L. (2018). Oregon recreational marijuana legalization: Changes in undergraduates' marijuana use rates from 2008 to 2016. *Psychology of Addictive Behaviors, 32*, 670–678.

Barker, A. K., & Moreno, M. A. (2020). Effects of Recreational Marijuana Legalization on College Students: A Longitudinal Study of Attitudes, Intentions, and Use Behaviors. *Journal of Adolescent Health*.

Wang, G. S., Haynes, C., Besharat, A., Lait, M.-C. L., Green, J. L., Dart, R. C., & Roosevelt, G. (2019). Brief Report: Characterization of Marijuana Use in US College Students by State Marijuana Legalization Status as Reported to an Online Survey. *The American Journal on Addictions, 28*, 266–269.

Jones, J., Nicole, Jones K., & Peil, J. (2018). The impact of the legalization of recreational marijuana on college students. *Addictive Behaviors, 77*, 255–259.

Alley, Z. M., Kerr, D. C. R., & Bae, H. (2020). Trends in college students' alcohol, nicotine, prescription opioid and other drug use after recreational marijuana legalization: 2008–2018. *Addictive Behaviors, 102*, 106212.

Høring - Rusreform fra straff til hjelp [Drug reform from punishment to help], available at https://www.regjeringen.no/no/dokumenter/horing---rusreform-fra-straff-til-hjelp/id2683686/ Rusreformutvalgets [Drug reform committee]: Regjeringen; 2020.

Stone, A. L., Becker, L. G., Huber, A. M., & Catalano, R. F. (2012). Review of risk and protective factors of substance use and problem use in emerging adulthood. *Addictive Behaviors, 37*, 747–775.

Haardörfer, R., Berg, C. J., Lewis, M., Payne, J., Pillai, D., McDonald, B., & Windle, M. (2016). Polytobacco, marijuana, and alcohol use patterns in college students: A latent class analysis. *Addictive Behaviors, 59*, 58–64.

Grevenstein, D., Nagy, E., & Kroeninger-Jungaberle, H. (2015). Development of risk perception and substance use of tobacco, alcohol and cannabis among adolescents and emerging adults: Evidence of directional influences. *Substance Use & Misuse, 50*, 376–386.

Lopez-Quintero, C., & Neumark, Y. (2010). Effects of risk perception of marijuana use on marijuana use and intentions to use among adolescents in Bogota. *Colombia, Drug Alcohol Depend, 109*, 65–72.

Pedersen, W., Fjær, E. G., Gray, P., & von Soest, T. (2016). Perceptions of harms associated with tobacco, alcohol, and cannabis among students from the UK and Norway. *Contemporary Drug Problems, 43*, 47–61.

Piontek, D., Kraus, L., Bjarnason, T., Demetrovics, Z., & Ramstedt, M. (2013). Individual and country-level effects of cannabis-related perceptions on cannabis use. A multilevel study among adolescents in 32 European countries. *Journal of Adolescent Health, 52*, 473–479.

Johnston, L. D., O'Malley, P. M., Miech, R. A., Bachman, J. G., & Schulenberg, J. E. (2017). *Monitoring the Future national survey results on drug use, 1975–2016: Overview, key findings on adolescent drug use*. Ann Arbor: Institute for Social Research, The University of Michigan.

Williams, J., van Ours, J. C., & Grossman, M. (2016). Attitudes to legalizing cannabis use. *Health Economics, 25*, 1201–1216.

Ellis, J. D., Resko, S. M., Szechy, K., Smith, R., & Early, T. J. (2019). Characteristics Associated with Attitudes toward Marijuana Legalization in Michigan. *Journal of Psychoactive Drugs, 51*, 335–342.

Palamar, J. J., Ompad, D. C., & Petkova, E. (2014). Correlates of intentions to use cannabis among US high school seniors in the case of cannabis legalization. *International Journal of Drug Policy, 25*, 424–435.

Miech, R. A., Johnston, L., O'Malley, P. M., Bachman, J. G., Schulenberg, J., & Patrick, M. E. (2015). Trends in use of marijuana and attitudes toward marijuana among youth before and after decriminalization: The case of California 2007–2013. *International Journal on Drug Policy, 26*, 336–344.

Leung, J., Chiu, V., Chung, J. Y. C., Hall, W. D., & Chan, G. C. K. (2020). How many more young Australians say that they would use cannabis if it were legal? *Drug and Alcohol Review, 39*, 768–772.

Leal, W. E., & Jackson, D. B. (2019). The role of energy drink consumption in the intention to initiate marijuana use among adolescents. *Addictive Behaviors, 93*, 240–245.

Egnell, S., Villman, E., & Obstbaum, Y. (2019). Cannabis policy and legislation in the Nordic countries: A report on the control of cannabis use and possession in the

Nordic legal systems. *Available at: Https://nordicwelfare.org/wp-content/uploads/2019/04/Cannabis-policy-and-legislation-in-the-Nordic-countries_FINAL.pdf Nordic Welfare Centre*.

European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). (2019b). Norway, Country Drug Report 2019. Available at https://www.emcdda.europa.eu/publications/country-drug-reports/2019/norway_en.

Christiansen, S. G., & Bretteville-Jensen, A. L. (2018). Who seeks treatment for cannabis use? Registered characteristics and physical, psychological and psychosocial problem indicators among cannabis patients and matched controls. *BMC Public Health, 18*, 780.

Pedersen, W., & Von Soest, T. (2015). Which substance is most dangerous? Perceived harm ratings among students in urban and rural Norway. *Scandinavian Journal of Public Health, 43*, 385–392.

Sznitman, S. R., & Bretteville-Jensen, A. L. (2015). Public opinion and medical cannabis policies: Examining the role of underlying beliefs and national medical cannabis policies. *Harm Reduction Journal, 12*, 46.

Sivertsen, B., Råkil, H., Munkvik, E., & Lønning, K. J. (2019). Cohort profile: The SHoT-study, a national health and well-being survey of Norwegian university students. *BMJ open, 9*. e025200-e025200.

Legleye, S. (2018). The Cannabis Abuse Screening Test and the DSM-5 in the general population: Optimal thresholds and underlying common structure using multiple factor analysis. *Int J Methods Psychiatr Res, 27*, Article e1597.

Legleye, S., Piontek, D., Kraus, L., Morand, E., & Falissard, B. (2013). A validation of the Cannabis Abuse Screening Test (CAST) using a latent class analysis of the DSM-IV among adolescents. *International Journal of Methods in Psychiatric Research, 22*, 16–26.

Cuenca-Royo, A. M., Sánchez-Niubó, A., Forero, C. G., Torrens, M., Suelves, J. M., & Domingo-Salvany, A. (2012). Psychometric properties of the CAST and SDS scales in young adult cannabis users. *Addictive Behaviors, 37*, 709–715.

StataCorp. Stata: Release 15. Statistical Software. College Station, TX: StataCorp LP.; 2017.

Gunn, R. L., Aston, E. R., Sokolovsky, A. W., White, H. R., & Jackson, K. M. (2020). Complex cannabis use patterns: Associations with cannabis consequences and cannabis use disorder symptomatology. *Addictive Behaviors, 105*, 106329.

Nilsen, R. M., Vollset, S. E., Gjessing, H. K., Skjaerven, R., Melve, K. K., Schreuder, P., … Magnus, P. (2009). Self-selection and bias in a large prospective pregnancy cohort in Norway. *Paediatric and Perinatal Epidemiology, 23*, 597–608.

Rothman, K. J., Gallacher, J. E., & Hatch, E. E. (2013). Why representativeness should be avoided. *International Journal of Epidemiology, 42*, 1012–1014.

Knapstad, M., Sivertsen, B., Knudsen, A. K., Smith, O. R. F., Aarø, L. E., Lønning, K. J., & Skogen, J. C. (2019). Trends in self-reported psychological distress among college and university students from 2010 to 2018. *Psychological Medicine*, 1–9.

Heradstveit O., Skogen J. C., Brunborg G. S., Lønning K. J., Sivertsen B. Alcohol-related problems among college and university students in Norway: extent of the problem, Scandinavian Journal of Public Health: 0: 1403494819863515.

Heradstveit, O., Skogen, J. C., Edland-Gryt, M., Hesse, M., Vallentin-Holbech, L., Lønning, K.-J., & Sivertsen, B. (2020). Self-Reported Illicit Drug Use Among Norwegian University and College Students. Associations With Age, Gender, and Geography, Frontiers. *Psychiatry*, 11.