Which substance is most dangerous? Perceived harm ratings among students in urban and rural Norway

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ABSTRACT

Background: Recent studies have challenged the idea that illegal substances are necessarily associated with more harm than those that are legal. We investigate perceived drug harms among students at the University of Oslo (UO) and at a smaller university located on Norway's coast in a more conservative and religious region, called "Coastal University" (CU).

Methods: Surveys ($n = 458$) about perceived physical harm, mental health conditions, dependence, injuries and social consequences that may be associated with the use of tobacco, alcohol and cannabis. We also collected information about substance use. Analyses of variance and multiple regression analyses were used to examine whether harm ratings differed for different drugs, whether drug type, gender and university site interacted in predicting harm ratings, and what role the participants' own substance use played in their harm ratings.

Results: UO students rated cannabis as overall less harmful than alcohol, while the opposite was true for CU students. Tobacco received the highest physical harm score. Alcohol was rated as most harmful with regard to injuries; cannabis as most harmful with regard to mental health consequences. Use of the substance in question was associated with a reduced harm rating. This was particularly true for cannabis.

Conclusion: Norwegian students rate the harms of substances differently from previous reports from the Norwegian normal population. Most importantly, their relative ratings of cannabis harms were lower. However, the pattern was most evident among students from the urban Oslo area.

Keywords: Harm ratings, perceived harm, drug policy, tobacco, alcohol, cannabis

Introduction

In two recent and frequently cited studies, David Nutt and co-workers developed so-called "rational drug harm scales" (1, 2). Panels of experts rated substance harm using "multi criteria decision analyses". The main finding was the poor correlation between the classification of drugs, according to the British Misuse of Drugs Act, and experts' harm scores. Alcohol was rated overall as the most harmful substance among the experts, well above e.g. the most prevalent illegal substance, cannabis. Researchers from France (3) and the Netherlands (4), have later reported similar results. These studies have been criticized on a number of grounds (see e.g.: 5, 6). However, most scholars have welcomed the findings as a fruitful corrective to typical perceptions of legal and illegal drugs and their associated harms. The studies have received broad media coverage in many countries.

Drug users' own drug-related harm perceptions were also investigated in a recent web-based survey sample of active drug users from the U.K. (7). The findings were quite similar to those of Nutt and co-workers, with alcohol ranked among the more dangerous substances while cannabis was ranked among the least dangerous. Few studies have investigated drug harm perceptions outside expert groups and such highly selected samples. Norway is an exception, as such perceptions have been monitored in population-based studies since the mid-1960s (8-10). Contrary to the reports by Nutt et al., illegal substances have always been rated as more harmful than legal substances. Indeed, the illegal substances which have been rated, have changed over this time period, with e.g. morphine and LSD being included in the 1960s, while e.g. heroin and amphetamines were first introduced in the 1980s. Cannabis has been included throughout all data collections and has remained in the "dangerous" illegal substance group, well ahead of alcohol and tobacco.

The complex relation and tensions between international drug policy and control on the one hand and and previous research is the back-drop for these studies. International drug

control is, in principle, justified by the harms or risk of drug use, described in e.g. various UN conventions. In the 1961 convention, risk was formulated in terms of "the serious evil" from "addiction to narcotic drugs"; in the 1971 convention in terms of "the public health and social problems from abuse" of narcotic drugs (11). Based on these conventions, illegal substances have for many decades been treated and described through a completely different rhetoric than those surrounding legal drugs such as tobacco and alcohol.

Before the two Nutt et al papers, several research groups had presented alternatives to the typical perspectives underling the UN conventions. Already in the late 1990s, a group of researchers compared the severity of health effects for "heavy users of different substances in their most harmful common form". Alcohol ranked highest, tobacco and heroin was placed in the middle and cannabis at a lower level (12). At the same time, a French research committee ranked substances according to their "general toxicity". Alcohol, tobacco, cocaine and heroin were rated as "strong" or "very strong", while cannabis was rated as "very weak". However this rating resulted in a public storm in France, indicating the degree of sensitivity of the topic (11). The sensitivity of the topic may also be a reason why a WHO report later concluded that harm comparisons between different drug "tend to be speculative" (11). Thus, the Nutt papers echo previous studies questioning the official grading of harm underlying the legal schedules. However, up till the publication of the Nutt papers, these perspectives had got relatively little public attention.

On the other hand: during the last decade pressure against the international drug policy has increasingly built up. The criticism is formulated along at least three lines. First, politicians, particularly those in Latin America, argue that their countries experience large costs due to corruption and violence from the illegal drug economy (13). Second, one in three U.S. states have now legalized cannabis in medical programmes, while four states (Colorado, Washington, Oregon and Alaska) as well as Uruguay, have also legalized cannabis "for

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pleasure" (14). Third, increasing proportions of opiate addicts are enlisted in opioid maintenance programmes, creating new concepts of "harm reduction" and "illness" to replace "crime". Thus, there are signs of a paradigm shift in drug policy, as well as a shift in perceptions of the dangers of illegal drugs in general and of cannabis most specifically.

Our study aim is to investigate drug harm rankings among Norwegian university students. Located in the capital Oslo (640,000 inhabitants), the University of Oslo (UO) is the largest in the country. The second university sampled is located in a coastal city of approximately 100,000 inhabitants in a more conservative and religious area (15). We refer to this university as "Coastal University" (CU).

We focused on the three most prevalent substances: tobacco, alcohol and cannabis. The prevalence of tobacco use is decreasing in Norway, particularly among young people, and smoking patterns are gradually being marginalized (16). In contrast, alcohol is used among 90% of adults and its consumption has increased in recent decades (17). Cannabis use has remained at mid-to-low prevalence levels in Europe. To some degree, although cannabis users are still characterized by the socio-cultural opposition of the 1960s, particularly among adults, there are also signs of social marginalization (18).

In this study, we addressed the following issues.

1. How do Norwegian students rank the three most prevalent psychoactive substances, tobacco, alcohol and cannabis on different dimensions of harm?

2. Are there differences in harm perceptions between UO and CU students? Are there gender differences?

3. To what degree do harm ratings reflect students' own substance use?

Methods

Sample and procedure

The sample consisted of bachelor-level students at the beginning of their first year in courses in the social sciences at UO and CU. They were asked to complete a short questionnaire. The questionnaire was administered anonymously. The first page provided information about the study aims, the anonymous nature of the study and that participation was voluntary. This information was also given verbally by the lead author in all classes sampled. A total of 458 students participated, 280 from UO and 178 from CU. We did not register non-participants but attrition was negligible based on our observations. The study was approved by the Research Ethics Committee of the Department of Psychology at UO.

Measures

Based on Nutt et al. (7), we developed an instrument for measuring five dimensions of possible drug harms. We first asked: "We are interested in your opinion on how harmful tobacco, alcohol and cannabis can be in different areas of life. Answer on a scale from 1 to 6, from "Not harmful" to "Very harmful"". We then listed the following areas: (i) physical harms (e.g. cancer, cardio-vascular diseases, lung diseases, liver diseases); (ii) mental health conditions (e.g. learning disabilities, apathy, anxiety, depression, psychosis); (iii) dependence (e.g. problems with quitting use, despite serious consequences); (iv) injuries (e.g. drowning, falls or traffic accidents, quarrels, violence); (v) social consequences (e.g. break-up of family relations, educational problems, problems with the police). All three substances were rated in a similar manner; thus, one score was given for each substance on each domain. We also calculated a mean score for each substance. Internal reliability was 0.69, 0.72 and 0.82 for tobacco, alcohol and cannabis harm ratings, respectively.

We then asked: "Do you smoke?" Response options were on a 5-point scale: 1. "No, never", 2. "Have never smoked regularly and do not smoke at all now", 3. "Have smoked regularly, but have quit altogether now", 4. "Smoke, but not daily", 5. "Smoke daily".

Smoking was dummy-coded so that those who reported no regular smoking at any time were contrasted with those who smoked regularly earlier but not now, those who reported non-daily smoking, and those who reported daily smoking. We also asked: "How many times have you drunk alcohol in the course of the previous 12 months?" Response options were on a 5-point scale from "Never" to "More than three times a week". For some analyses, we dummy-coded alcohol use by contrasting respondents who had not drunk any alcohol in the previous 12 month with those who had drunk alcohol a few times a month or less, approximately once a week, and more than once a week, respectively. Finally, we asked two questions about cannabis: "Have you ever used cannabis?", with response options from "No" to "More than 50 times", and "How many times have you used cannabis in the course of the past 12 months?", with response options from "None" to "More than 50 times". Again, dummy coding was used to contrast respondents with no prior experience with cannabis use and those who had used cannabis previously but not during the last 12 months, those who had used once during the last 12 months, 2–10 times, 11–50 times, or more frequently during the last 12 months. We also asked to what religion or denomination the respondent belonged, with response options: "No religion", "Christianity", "Islam" or "Other religion". In all analyses, we dummy-coded religious affiliation as three variables on which we contrasted no religion with the other three response options.

Statistics

T-tests were conducted to examine differences in harm ratings according to gender and university. Analyses of variance (ANOVA) and analyses of covariance (ANCOVA) were utilized to examine whether harm ratings differed for different drugs and to investigate whether drug type, gender and university interacted in predicting harm ratings. Finally,

multiple linear regression analyses were conducted to investigate the combined effects of gender, university site, participants' own substance use and religion on harm ratings.

Results

Table 1 shows that the prevalence of daily and non-daily smoking did not differ between UO and CU students; nor were there differences between the proportion of regular alcohol users (i.e. those who used alcohol at least 2–3 times per month) at the two sites. Current and previous use of cannabis was, however, more prevalent at UO.

In Figure 1, mean harm ratings for all three substances on each of five dimensions are shown for UO and CU students. Tobacco was rated lowest on mental health conditions, injuries and social consequences, but highest on physical harms and also very high on dependence. Alcohol was rated as highest on injuries, while cannabis was rated highest on mental health consequences. *T*-test results showed no significant differences between students at the two universities on their ratings of harms associated with alcohol and smoking. However, students at CU rated cannabis as more harmful than students at UO with regard to physical harm, mental health consequences, injuries and social harm ($p < 0.001$), and dependence ($p < 0.01$). The final three columns show the total harm score for each substance by university. There were no significant differences in the total ratings of tobacco (UO: mean [M] = 3.41, standard deviation [SD] = 0.77; CU: M = 3.52, SD = 0.83; $p > 0.05$) or alcohol (UO: M = 4.69, SD = 0.76; CU: M = 4.74, SD 0.74; $p > 0.05$). Again, scores on cannabis harm ratings differed, with a mean of 4.55 (SD = 1.02) for UO and 5.03 (SD = 0.79) for CU ($p < 0.001$). We also examined whether university differences remained after controlling for age and gender. ANCOVAs were conducted with harm rating scores as dependent variables, university site as factor and age and gender as covariates. Results identical to those observed by *t*-tests were obtained, with no differences between universities for alcohol and tobacco

harm ratings and significant differences for all types of cannabis harm, except for mental health consequences.

As a next step, ANOVAs were conducted to examine differences in harm ratings according to drug type, university and gender in greater detail. By including drug type, university site and gender as factors in a three-way ANOVA, main effects of these three variables on harm ratings in all five areas and on mean scores across all five areas were investigated. Main effects provide information about differences in the level of harm ratings between drug types, university sites and gender, respectively. As shown in Table 2, for all six measures, ratings of harm differed significantly according to drug (i.e. the mean effects of drug type were significant). More specifically, Bonferroni post hoc tests (rightmost column in Table 2) showed that physical harm and dependence ratings were highest for tobacco use, whereas tobacco use was considered the least harmful for mental health conditions, injuries and damages, social consequences and on overall score. Although several significant differences in harm ratings were observed between alcohol and cannabis, those differences were minor, with the exception of injuries and damages, on which alcohol use was considered substantially more harmful.

All main effects of gender were also significant, indicating that females considered all three drug types to be more harmful than did males on all six harm-rating measures. However, such findings must be interpreted in the context of several significant interaction effects between gender and drug type (i.e. interaction effects were significant for the overall harm score, physical harm, dependence and injuries; see Table 2). Such interaction effects show that the gender difference in harm ratings differed according to drug. More detailed analyses showed that gender differences in overall harm ratings were substantially higher for cannabis (mean difference = 0.92, $t = 8.87$, $p < 0.001$) than for tobacco (mean difference = 0.32, $t = 3.54$, $p < 0.001$) and alcohol (mean difference = 0.33, $t = 3.81$, $p < 0.001$). Moreover,

interaction effects between drug type and university site reflect that cannabis was rated more harmful at CU than at UO in all areas except mental health harms. These results are in accordance with those shown in Figure 1; differences in harm ratings between universities were observed for cannabis only. Moreover, we conducted additional t-tests showing that students at the UO rated cannabis as significantly less harmful than alcohol (t = 2.00, p = .046), while the opposite was true for students at the CU (t = 4.52, p < .001).

Finally, a series of multiple linear regression analyses were conducted to investigate the possible effects of participants' own substance use and their religion on harm ratings. For this purpose, total tobacco, alcohol and cannabis harm ratings were used as dependent variables and university, age, gender, religion and respondents' substance use were independent variables. The results are presented in Table 3. Current daily smoking was strongly and negatively associated with tobacco harm scores and a somewhat weaker association was found with previous smoking. All levels of alcohol use were associated with reduced alcohol harm ratings compared with non-use. Increasing level of cannabis use was related to reduced cannabis harm ratings. Female gender was associated with higher scores on all harm measures. Being Christian was related to rating alcohol and cannabis as more harmful than those reporting not belonging to any religion. Islamic faith was related to higher harm ratings for alcohol only. After controlling for religion and earlier cannabis use, university site still significantly predicted cannabis harm rating scores, although to a lesser degree. We also compared the change in R^2 when including substance use in the three models shown in Table 3. Here, the increase when including cannabis (0.14) was considerably stronger than when including tobacco (0.05) or alcohol (0.06). Thus, experiences with cannabis played a more prominent role in cannabis harm perceptions than did the use of tobacco or alcohol on perceived harm of those two substances.

Discussion

Norwegian students rated perceived harms of tobacco, alcohol and cannabis differently than has been reported previously in population-based studies over the last four decades. Previously, among lay people, cannabis has been regarded as a rather dangerous substance, obviously due to its illegal status. In our sample of university students we now found small differences between harm ratings for alcohol and cannabis. However, along all harm dimensions, students at "Coastal University"—located in a more rural, religious area of Norway—rated cannabis as more harmful than did students at the University of Oslo. At both universities, tobacco was rated as most dangerous with regard to physical harm (e.g. cancer and cardio-vascular diseases). Alcohol was rated as more harmful on the dimension of injuries and violence, whereas cannabis was rated most harmful concerning mental health consequences. Females rated all substances, but particularly cannabis, as more harmful than did males. Own use of tobacco, alcohol or cannabis was associated with reduced perceived harm of that particular substance. However, this association was of greatest magnitude for cannabis.

Our study had limitations; most important was that we used selected samples of students. In addition, females comprised the majority of the sample, mirroring the gender-based constituency at Norwegian universities, particularly in the social sciences and humanities. Hence, the study should be replicated using more representative samples.

Even though our samples were not representative, these findings may indicate broader changes in attitudes towards cannabis in Norway. In a Norwegian population-based study from 1968, cannabis was rated as the second most harmful substance (after LSD) and as more dangerous than e.g. morphine (8). However, since the 1980s, cannabis has been ranked as clearly less dangerous than heroin and amphetamines in such studies (9, 10). Our findings suggest that possible harms of cannabis may have been further downscaled so that it is now

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considered rather similar to alcohol. Diffusion theory suggests that dispersal of attitudes as well as practices in the substance use area may run through several stages such that early adopters have high social status and are more "cosmopolite", whereas groups with fewer resources are typically involved at the later stages of dissemination (19). Even though cannabis has now been used in Norway for almost fifty years, one may hypothesize that new political developments may first be adopted by urban university students. The difference between UO and CU in this respect may be indicative of trends first visible in the more urban and "cosmopolite" Oslo area.

The changes observed may obviously mirror developments in the U.S.A., where support for legalizing cannabis has been increasing rapidly. In a recent national poll, 58% were in favour of legalizing cannabis and only 39% were opposed. Support was strongest among young adults in larger cities and those who were highly educated (20). A search of a media monitoring service using the keyword "cannabis" revealed that the number of hits per year in Norwegian newspapers increased from 2011 to 2012 from slightly more than 100 to more than 900 and remained at this level during 2013 and 2014. A large proportion of these reports were on developments in the U.S.A. Several youth organizations have also taken positions opposing current drug policies. For example, the youth organization of the Progress Party, which is currently part of the government coalition, is now in favour of legalizing cannabis (21). There are as well intense online debates in which alternatives to the present prohibitionist position are outlined (see also 22).

To what degree do the students' harm scores reflect what is known from research on substance harms? Firstly, as discussed in the first part of this paper, the Nutt et al. papers echoed previous scientific reports which rated alcohol as a very harmful substance, while cannabis was rated as less dangerous (11, 12). Thus, the up-scaling of alcohol harms and down-scaling of cannabis harms is in line with research report over several decades. When it

comes to the concrete rating of the different dimensions, there is also a fair correspondence between students' ratings and those typically done by researchers. The high ratings of physical harm for tobacco reflect a large research-based body of knowledge on tobacco-caused morbidity and mortality. The scores for alcohol and perceived risk of injuries and violence also correspond well with numerous research reports. Students at both universities rated cannabis as the most harmful substance with regard to mental health problems. Even if the often-cited association between cannabis use and schizophrenia (23) may be less certain than suggested (24), there is little doubt than cannabis may lead to psychotic episodes and to cognitive impairment (25). However, CU students rated the risk for cannabis dependence higher than for tobacco, which is not in accordance with common research-based knowledge, while UO students reported views more in line with current research reviews (see e.g. 26).

For all harm rankings, females reported higher scores than did males. This finding is consistent with previous research suggesting that females are more in favour of restrictive alcohol and drug policies than are males (27). It may also reflect that males typically have a lower perceived level of vulnerability in the context of risk-taking (28). Data from the U.S.A. also suggest that liberal and left-wing political attitudes correspond with support for legalization of cannabis (20). In Norway, females have, over the last decades, voted more "to the left" than do men (29). Thus, although one could hypothesize that harm perceptions with regard to cannabis to an increasing degree will follow such new gender-based lines, apparently they do not. It may also reflect that a reformed drug policy in the Norwegian context has not been an issue for the social democratic and left wing parties, but to a higher degree has been limited to the more liberalistic right-wing of the political spectrum (30).

Conclusion

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Norwegian students now rate perceived harms of tobacco, alcohol and cannabis differently than what has been reported from population-based studies since the 1960s. Cannabis was previously regarded as much more harmful than tobacco and alcohol. Our findings indicate that university students now have more nuanced and complex perceptions: Tobacco was rated as most dangerous with regard to physical harm; alcohol was regarded as most harmful with regard to injuries and violence, while cannabis was rated highest for mental health consequences. These findings may be interpreted as an indication that perceived harms associated with cannabis are being reduced compared with those related to legal substances, and in particular those related to alcohol. Note however that this process appears to have come further among students at the University of Oslo compared with those at "Coastal University", located in a more rural, conservative region of Norway. To some degree, these changes also seem to mirror higher levels of cannabis use among students from the more urban Oslo area.

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Table 1

Prevalence of daily and non-daily smoking, proportion of "current alcohol users"; and proportion with lifetime and 12-month prevalence of cannabis use at the University of Oslo and "Coastal University".

	Oslo University ($n = 280$)		Coastal University ($n = 178$)		Chi-square test of significance
	n	%	n	%	
Smoking					
Non-daily	38	(13.6)	23	(12.9)	
Daily	10	(3.6)	7	(3.9)	ns
Use of alcohol a few times per month or more	214	(76.4)	139	(78.1)	ns
Lifetime use of cannabis	120	(42.9)	50	(28.1)	$p < 0.001$
Cannabis use in the previous 12 months	77	(27.5)	12	(6.7)	$p < 0.001$

Figure 1. Mean harm rating scores for tobacco, alcohol and cannabis on five dimensions and total harm ratings. Students from the University of Oslo and "Coastal University" ($n = 455$).
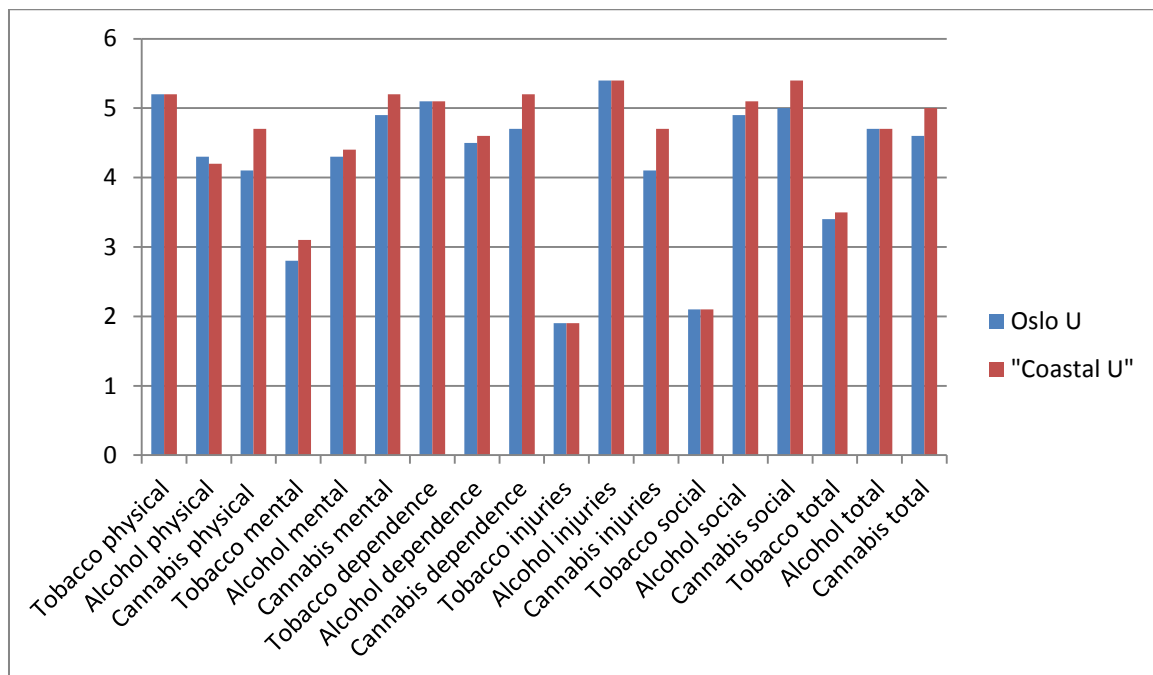
Differences between the two universities are significant only for ratings of cannabis with regard to physical harm, dependence, injuries, social harm, total harm ($p < 0.001$), and dependence ($p < 0.01$).

Table 2

Analysis of variance results with drug type, gender and university site as factors and drug harm ratings as dependent variables.

$n = 457$	Tobacco M (SD)	Alcohol M (SD)	Cannabis M (SD)	ANOVA main effects			ANOVA interaction effects			Post hoc test of drug type differences (Bonferroni)
				Drug type F	Gender F	Site F	Drug type * Gender F	Drug Type * Site F	Drug Type * Gender * Site F	
Overall	3.45 (.79)	4.71 (.75)	4.74 (.97)	249.06***	16.05***	1.26	8.78***	9.29***	1.66	TA, TC
Physical harms	5.20 (.88)	4.28 (1.09)	4.38 (1.41)	64.22***	19.16***	.33	3.35*	10.48***	1.79	TA, TC
Mental health conditions	2.90 (1.43)	4.36 (1.21)	5.00 (1.10)	206.00***	40.36***	.01	2.59	2.26	.91	All
Dependence	5.13 (1.07)	4.50 (1.26)	4.86 (1.29)	30.56***	23.59***	.97	9.05***	3.54*	1.02	All
Injuries, damages	1.88 (1.17)	5.39 (.83)	4.29 (1.44)	752.19***	14.65***	1.35	11.35***	5.97**	.51	All
Social consequences	2.12 (1.20)	5.01 (1.02)	5.18 (1.02)	733.43***	24.21***	1.06	.35	3.98*	1.57	TA, TC

Notes. M = Mean; SD = standard deviation. TA = significant difference between tobacco and alcohol harm rating; TC = significant difference between tobacco and cannabis

harm ratings; All = significant difference between harm ratings of all three drug types. *** $p <0.001$; ** $p <0.01$;* $p < 0.05$

Table 3

Multiple linear regression analyses with tobacco, alcohol and cannabis harm ratings as dependent variables.

	Tobacco			Alcohol			Cannabis		
	B	β	T	B	β	t	B	β	t
Gender	0.26	0.13	2.88**	.31	.17	3.62***	.72	.30	7.56***
Site	0.06	0.04	.80	−.02	−.01	.25	.19	.10	2.37*
Age	0.00	0.00	0.09	0.02	0.06	1.31	0.01	0.01	0.24
Religion	(reference: no religion)			(reference: no religion)			(reference: no religion)		
Christianity	0.21	0.13	2.74**	0.02	0.01	0.25	0.16	0.08	1.98*
Islam	0.64	0.12	2.64**	−0.04	−0.01	0.16	0.17	0.03	0.67
Other	−0.11	−0.02	0.44	0.18	0.04	0.90	−0.06	−0.01	0.28
Smoking	(reference: no smoking)			–	–	–	–	–	–
Smoked earlier	−0.30	−0.12	2.40*	–	–	–	–	–	–
Non-daily smoking	−0.35	−0.08	1.80	–	–	–	–	–	–
Daily smoking	−0.50	−0.21	4.63***	–	–	–	–	–	–
Alcohol use	–	–	–	(reference: not used last year)			–	–	–
A few times a month or less	–	–	–	−0.55	−0.36	3.45**	–	–	–
Approx. once a week	–	–	–	−0.81	−0.49	4.89***	–	–	–
More than once a week	–	–	–	−0.74	−0.29	3.90***	–	–	–
Cannabis use	–	–	–	–	–	–	(reference: never used)		
Used before, but not last year	–	–	–	–	–	–	−0.50	−0.20	4.67***
Used once last year	–	–	–	–	–	–	−0.60	−0.13	3.38**
Used 2–10 times last year	–	–	–	–	–	–	−1.11	−0.33	8.14***
Used 11+ times last year	–	–	–	–	–	–	−1.08	−0.24	5.92***

Note. B = Unstandardized regression coefficient; β = standardized regression coefficient