Magnitude and determinants of Substance use among University of Antwerp Students in Belgium: a multilevel analysis approach

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Abstract

Substance use is one of the public health issues among university students. The study aimed to estimate the prevalence, influence of faculty, and identify possible risk factors for substance use among University of Antwerp students. A cross-sectional study was conducted among University of Antwerp students from March to April 2021. A total of 2769 students participated in the online survey. The outcome variable of interest was measured as recent use of alcohol (non-drinkers, low-risk drinkers, and risky drinker), cannabis use (yes/no), and use of stimulant drugs (yes/no) in the last one year prior to the study. A multilevel generalized linear mixed-effect model was used to analyze the data. Based on the self-reported survey results, the overall prevalence of recent low-risk alcohol use was 68.40%, compared to 21.67% for risky alcohol use, whereas the prevalence of recent cannabis and stimulant drug use was 16.32% and 4.37%, respectively. In the full multivariable generalized linear mixed effect model, being male (OR = 1.77), being a working student (OR = 1.54), lifetime use of cigarettes (OR = 4.07), being a masters student (OR = 1.70), and living independently from parents (OR = 1.71) were identified as risk factors for recent use of alcohol. With regard to recent use of cannabis in the full model, ages between 26 and 30 years (OR = 3.69), master students (OR = 2.02), and following other programs (preparatory and bridging) (OR = 2.52) were determinant factors. Being a master's student was the only individual-level variable associated with lower odds of the recent use of stimulant drugs (OR = 0.40). In the full multivariable model, the proportion change variance for recent alcohol, cannabis, and stimulant drug use was estimated as 83.54, 20.93, and -38.32%, respectively. In addition, the final full model results showed a median odds ratio of 1.11, 1.28, and 3.00 for the recent use of alcohol, cannabis, and stimulant drugs, respectively. The magnitude of alcohol use among University of Antwerp students was found to be high, whereas the use of cannabis and stimulant drugs was moderate and low, respectively. Being male, being over the age of 26 years, working students, pursuing master's and other programs, smoking cigarettes, and living away from parents were risk factors for substance use among students.

Introduction

Substance use is the use of alcohol, cigarettes, illegal drugs, prescription drugs, inhalants, and solvents in an amount that is unsafe to an individual [1]. Substance abuse has become one of the world's most serious public health and socioeconomic issues [2]. According to a WHO report, cigarettes, khat, cannabis, cocaine, and alcohol are the most regularly consumed and utilized substances globally [3]. Psychoactive substances act on the neurological system and alter functions that control human beings’ thoughts, emotions, and behavior [4]. The 2014 European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) also reported that a quarter of all European adults have ever taken illicit drugs [5]. The prevalence of recent use of stimulant drugs among students in Flemish universities was 6.5% [6], cannabis use ranges from 17.00% to 19.30% [7], and alcohol use has been reported a 73.00% [8].

The first and second most consumed substances with an addictive potential in Belgium were alcohol and cannabis, which require public policy consideration [9]. The impact of these misuses can be short-term or long-term. Short-term consequences include a higher chance of accidental death, injury, criminal
behavior, violence victimization, unsafe sexual practices, educational failure, despair, and suicidal ideation [10-12]. In the long run, increased substance use disrupts youths' cognitive, emotional, and social development and may jeopardize eventual functioning in essential adult areas such as marriage, parenthood, and gainful employment [13, 14]. These psychoactive substances were also responsible for more than 250 million disability-adjusted life years lost in 2015 [15]. The global disease burden attributable to alcohol and illicit drug use accounts for 5.4% of the total disease burden [16, 17].

According to different researchers, various factors influence the use of such psychoactive substances. Lack of social support from families, peer pressure, a lack of entertainment facilities, and the easy availability of drugs have been identified as the main factors that predispose individuals to become substance abusers [18-23]. In some countries, policy-based factors such as a lack of a school curriculum and the absence of a punitive drug control system have been identified as the main factors that predispose individuals to become substance abusers [10, 24]. In other studies, individual factors like age, mental health condition, employment status, and wealth were the strongest predictors for illegal drug usage [8, 25, 26]. So, there is variation in the factors that influence substance use among students across different areas. Substance use begins at a young age, and adolescence is a critical risk stage for developing problematic use [27-29]. The age of a university student is generally related to increased experimentation and risk-taking activities, such as the usage of alcohol and illegal drugs [30-32]. Indeed, the issue is thought to be on the rise, and it has become a cause of concern for different countries. According to other studies, educational institutions are an important venue for young people's development that may influence substance use [33]. In addition, students take much of their time in and around their universities, where they are affected by school and community norms and culture. Especially at the faculty level, there are shared characteristics that are common among students [34]. The finding showed that 4.5% of the variation in the perceived binge drinking of alcohol among students in higher education in Belgium was attributed to the difference in their faculty [35]. Other reports showed the presence of strong faculty effects on substance use among students [35-41]. However, there is still a need for further research about the importance of contextual factors on students' level of substance use. In addition to educate young people, universities are ecological platforms for adolescent health, development, and habits. So, providing sufficient information to inform policymakers on how, when, and where to (re)allocate financial resources is important for substance misuse prevention. There is a lack of information on contextual factors associated with the use of alcohol, stimulant drugs, and cannabis among students in Belgium. In addition, there are no studies that showed the variation in the use of stimulant drugs and cannabis among students between faculties that used a multilevel analysis. Most of the previous studies were single-level studies, and the approach of multilevel studies enables one to deal with the effects of explanatory variables at different levels. It also provides more precise estimates of parameters than single-level logistic regression. This research aimed to determine the recent substance use prevalence, investigate the possible determinant factors that contribute to substance use, and point out the influence of faculty on substance use among University of Antwerp students. This research provides relevant information for the community and public health policymakers to make informed decisions. It can also be used to design platforms to support the interventions targeting high-risk groups.
for reducing the usage of these psychoactive substances among students. Furthermore, it alerts universities to play a vital role in preventing substance abuse and promoting good health in the community.

**Materials And Methods**

Data description and study. Data collection, questionnaire preparation, and measurement of outcome variables were done according to the Alcohol Use Disorder Guidelines developed WHO [42] and European Monitoring Centre for Drugs and Drug Addiction [43]. The research proposal was approved by the University of Antwerp master thesis committee.

Study design. A cross-sectional study design was conducted on the recent use of alcohol, cannabis, and stimulant drugs and associated factors among university students from March to April 2021.

**Study setting.** The study was conducted in the Flemish region at the University of Antwerp on four campuses, namely, Stadscampus, Drie Eiken, Groaneberger, and Middelheim. The university lifestyle is frequently associated with substance abuse [35, 44-46].

**Study Participants.** All university students who follow the bachelor, bridging, preparatory, and master's program enrolled at the University of Antwerp were eligible to participate in the survey. Both Belgian and non-Belgian students who speak the Dutch language participated in the questionnaire. Participants were informed about the importance of their participation in the survey, and the completion of the questionnaire was based on their voluntariness.

**Measure of predictor and outcome variables**

**Description of an outcome variable.** Recent use of alcohol was assessed for those students asked about their alcohol consumption within the last twelve months prior to the data collection. Alcohol includes the use of beer, wine, aperitifs, and strong drinks (whiskey, gin, and vodka). The recent use of alcohol was categorized based on three AUDIT-C (Alcohol use disorder identification test-consumption) scores of item questions which is developed by world health organization [42]. Initially, the frequency of alcohol use in the last twelve months prior to the study was asked and recorded. The possible responses to alcohol use were never, monthly, or less, one time per week, two to three times a week, and four times per week or more. Secondly, students were asked about the average number of standard glasses of alcohol consumed on a normal day in the last twelve months, and this was recorded as 0 to 2, 3 to 4, 5 to 6, 7 to 9, 10, or more. Thirdly, the students were also asked about the drinking frequency of six or more glasses of alcohol on a single occasion in the last year prior to the study, and the responses were answered as never, less than monthly, monthly, weekly, daily, or almost daily. The answer choices were given a score from zero to four. By summing the scores of the responses of three-item questions of an individual, the level of recent use of alcohol was categorized into three categories: non-drinkers (score of 0); low-risk drinkers (score of four and below); and risky drinkers (score of five and above) [47]. Recent use of the stimulant drugs was classified as those who had used prescribed stimulant drugs (methylphenidate,
dextroamphetamine, and atomoxetine) at least once in the previous twelve months before the start of the study [43]. Respondents who used cannabis at least once within the past twelve months prior to the study were recent users [43]. The drugs incorporated as cannabis were marijuana, weed, hashish, and cannabidiol. The use of stimulant drugs and cannabis in the last twelve months prior to the study was collected as yes (user) or no (non-user).

**Description of predictor variables**

**Individual level variables.** Determinant factors were observed at individual and contextual levels. Individual level factors like gender (male or female), age, starting age of cannabis, stimulant drugs, and alcohol, lifetime use of cigarettes (yes/no), and lifetime use of alcohol (yes/no) were assessed. The type of training (Bachelor, bridge, preparatory and master's programs), working status (working/non-working), the module of education (full-time education, evening classes, distance learning), and world view (Christian, Jewish, Islamic, Hindu, Buddhist, did not have a worldview) were also observed. In addition, participation in entertainment and social activities such as in sports clubs (yes/no), student councils (yes/no), religious associations (yes/no), and social-helping activities (yes/no) participation were also observed as an individual-level factor of recent use of alcohol, a stimulant drug, and cannabis. Furthermore, participation in drinking and gambling games were also observed as individual level hypothesized factors.

**Contextual level variables.** Contextual factors were observed at the family, school, and environmental levels. Living conditions (home/independent) were included as an environmental determinant of substance use. The faculty of students to which they belong was taken as a school-level factor. Fathers' and mothers' educational levels were considered as family contextual level factors. The parents' educational level was recorded as having no diploma, primary education, secondary education, and higher education.

**Data collection.** The data was collected by the Social Epidemiology and Health Policy Department at the University of Antwerp in collaboration with the Flemish Centre for Expertise in Alcohol and Drugs. The data was collected through an online survey questionnaire in March and April 2021 by sending the link to their email. Electronic-based data collection is fast and most achievable, which decreases the delay in data collection[48]. The data was collected from nine faculties, namely: Faculty of Business and Economics, Faculty of Pharmaceutical, Biomedical, and Veterinary Sciences, Faculty of Medicine and Health Sciences, Faculty of Arts and Philosophy, Faculty of Design Sciences, Faculty of Law, Faculty of Social Sciences, Faculty of Applied Engineering, and Faculty of Science.

Study size. The study was conducted using data collected from 2,769 University of Antwerp students who followed bridging, preparatory, bachelor's, and master's degree programs.

Data management and Statistical Analysis
Missing data management. The data was available in excel format and imported into STATA software version 16. Missing data was found in 23.72% of these responses on at least one variable of interest. To run an unbiased estimate of the parameters, missing data management was applied using multiple imputations by chained equations (MICE). Multiple imputations were done by declaring the *mi set* and *mlong* function. The variables were registered as imputed using the *mi register* imputed function. The twenty number of imputations and nine hundred ninety-nine seed numbers were used during the imputation of the data.

Descriptive analysis. For the overall data analysis, STATA software version 16 was employed. The analysis of descriptive statistics was conducted based on the imputed data using the *mi xeq* command function. Relative frequencies were calculated to observe the percentages of recent use of cannabis, alcohol, and stimulant drugs across hypothesized determinant factors.

Inferential analysis. Approaches for estimating the fixed effect and random effect parameters. Due to the clustering nature of the data (i.e., students nested within faculty), a multilevel generalized linear mixed effect model (GLMM) was used using the imputed data operating *mi estimate, or cmdok: meglm* function. The model allows for examining an association between recent use of cannabis, alcohol, and stimulant drugs with hypothetical determinant factors. In addition, it allows for an estimation of the contribution variation of the cluster variable and determinant factors. The hypothesized factors were observed at two levels, namely, individual, and contextual levels. A four-level GLM model was constructed: at the null, individual, contextual, and full levels (both individual and contextual factors simultaneously). The null model estimated the variance of recent alcohol, a stimulant drug, and cannabis use contributed by the cluster variable (faculty). The model was built by using binomial and ordinal families for recent use of cannabis, stimulant drugs, and alcohol, respectively.

To observe an association with the outcomes, the age of the students was categorized as <20, 20-25, 26-30, and >30 years [49]. The worldview of students was classified as having a worldview (Christian, Islamic, Jewish, Hindu, or Buddhist) and did not have a worldview. The educational level of students’ fathers and mothers was categorized as primary and under primary education (no diploma and primary education), secondary education, and higher education. The working status of students was also categorized as working and non-working students. Working students are students who work less than 20 hours per week and 20 hours or more per week. The type of training students follows also categorized as a bachelor degree, a master’s degree, and other programs (bridging programs and preparatory education).

A univariable logistic regression analysis was conducted to select the potential variables used in the multivariable generalized linear mixed effect model. A p-value <0.25 was included in a multivariable GLM model. The presence of multicollinearity between predictor variables was ascertained by drawing a correlation matrix and considered multicollinearity if a correlation coefficient value among predictor variables was greater than 0.7. The starting age of cannabis, alcohol, and stimulant drug use was found to be correlated with the age of sampled students. The proportional odds assumption was assessed using Brant test statistics for recent use of alcohol, which indicated the assumption was not violated (P-
value = 0.057). The odds ratio (OR), with a 95% confidence interval, was estimated as a measure of
association using a generalized linear mixed effect model. A two-level interaction effect of recent use of
alcohol with a product term of father and mother education level, type of training and father education,
type of training and mother education, living situation, and mother education level, living situation, and
father education level was assessed. An interaction effect between a product term of father’s education
and living situation, type of training and module of education, type of training, and father’s education in
association with recent use of stimulant drugs was observed. The hypothesized interaction effect
between recent use of cannabis with a product term of father and mother education, type of training and
mother education, type of training and father education, father education and living situation, mother
education and living situation, lifetime of cigarette, and lifetime use of alcohol was assessed. An
interpretation of the odds ratio categories of the variable was based on keeping faculty and other
variables constant. The significance level in fixed-effect parameters was set at a p-value of less than
0.05.

To estimate the influence of faculty on substance use, variance ($\sigma_u^2$), the median odds ratio (MOR), and
proportion change in variance (PCV) were computed at each level of the modeling process. The
proportional change in variance measures the change in cluster-level variance between the empty model
and the model with additional variables. At the same time, MOR expresses between-cluster variance on
an odds ratio scale [50].

Ethics approval and consent to participate. The study was reviewed and approved by the Ethics
Committee of Social Sciences and Humanities at the University of Antwerp (reference: SHW_20_121) on
February 1, 2021. All methods were carried out in accordance with relevant guidelines and
regulations. Informed consent was obtained from all study participants.

Consent to publish the data. Not applicable.

Results

Description of sampled participants. Of the total sampled population, 61.32% (1698) of participants were
females, and 38.68% (1071) were male students. The average age of sampled students was 21.61 years
(95% CI: 21.46-21.76). The results showed that the mean starting ages of alcohol, cannabis, and
stimulant drug use were 14.27, 19.00, and 16.47 years, respectively. Of the sampled participants, 59.26%
lived with their parents and 40.74% lived away from their parents.

Description of hypothesized determinant factors and prevalence of recent alcohol use, stimulant drug
use, and recent cannabis use. Table 1 shows descriptive information about recent use of alcohol,
stimulant drug, and cannabis. From a total of 2769 sampled students, 68.40% (95% CI: 66.42-69.93%),
and 21.67% (95% CI: 20.48-23.84%) were low-risk drinkers, and risky drinkers, respectively. Low-risk
drinkers constituted more than 50% among all the categories of the factors. The overall recent use of
stimulant drug and cannabis prevalence was 4.37% (95% CI: 3.18-5.21%) and 16.32% (95% CI: 14.97-
18.01 %), respectively. The prevalence of recent use of stimulant drugs in all categories of a variable was below 10%, except for those students who did not participate in gambling games (17.37%). The proportions of cannabis users and non-users were proportional among students above the age of 30 years (50.00 vs. 50.00) (Table 1).

Associated risk factors for recent alcohol use among university students. The results of the multivariable generalized linear mixed-effect model are presented in Table 2. The result of the final multivariable generalized linear mixed effect model showed being male (OR = 1.77 (95% CI: 1.45-2.15)) and having an age above 30 years (OR = 0.45 (95% CI: 0.24-0.87)) were found to be statistically significant with recent use of alcohol (Table 2). In addition, students who work at student jobs, follow master’s degree courses, being lifetime smokers, and live independently from their parents were found to be statistically significant factors for recent use of alcohol (p-value< 0.05). There was no observed interaction effect between variables in the final model.

**Determinant factors for the recent use of cannabis among university students.** The results of the final full multivariable generalized linear mixed effect model (faculty taken as a random effect) identified that being male (OR = 0.63 (0.48-0.82)), age group between 26 and 30 years (OR = 3.69 (95% CI: 1.89-7.18)), those who follow a master’s degree (OR = 2.02 (1.43-2.84)) and those who smoke cigarettes (OR = 0.57 (95% CI: 0.39-0.81)) were identified as statistically significant factors associated with recent use of cannabis. There was no contextual factor that had a significant effect on the recent use of cannabis. Furthermore, there was no interaction effect between variables in the final full model (Table 3).

Associated factors on recent use of stimulant drugs among university students. In the final multivariable model, recent use of stimulant drugs was associated with one individual-level variable. The students who follow master’s degrees program were less likely to be stimulant drug users (OR = 0.40 (95% CI: 0.16-0.98)) than students who follow bachelor degree during the last twelve months before the study was conducted. There was no interaction effect between variables in the final full multivariable model. The contribution variance of the cluster variable (faculty) in percentage and odds scale was estimated in each model (shown in Table 4).

**Discussion**

The study was a multilevel generalized linear mixed effect model analysis, conditioned on a random effect approach aimed to identify the possible factors, assess the effect of faculty, and estimate the prevalence of recent use of alcohol, cannabis, and stimulant drugs among University of Antwerp students.

The prevalence of low-risk drinkers among students was 68.40% (95 % CI: 66.42-69.93 %), and risky drinkers were 21.67% (95 % CI: 20.48-23.84 %). The prevalence of risky drinking was lower than in the study conducted among university students in Italy [51]. But the prevalence of low-risk alcohol drinking was higher as compared to the study conducted by Mereu et al. [51]. The classification which is used in our study is not comparable with findings from previous studies on Belgian university students because
of the different approaches used to assess recent alcohol intake [8, 52, 53]. We used this classification to optimally utilize the available information, and the classification guidelines provide more precise estimates. Regarding health, risky drinking behavior is an issue among European students [54-56]. The high prevalence of low and risky alcohol drinking might be associated with its availability and decreased follow-up of parents. Risky alcohol intake has undesirable consequences, such as social conflict and unwanted sexual behavior [57].

The prevalence of recent use of cannabis users in the last twelve months prior to data collection was 16.32% (95% CI: 14.97-18.01%), which was found to be lower than the research findings done previously in Belgium in 2005 (24.50%) and 2013 (19.30%) (7). The lower prevalence of recent use of cannabis in our study could be associated with the fact that students might stay at home due to COVID-19 restrictions and be unable to access the drugs. The use of cannabis among students could be associated with the availability of the different forms of cannabis through production and importation from other countries [58].

Among the sampled participants, the prevalence of recent stimulant drug users was 4.37% (95% CI: 3.18-5.21%). This finding is lower than that of the previous study in Belgium among Flemish students (6.5%) [6]. Our finding is also lower than the study done among French-speaking university students (5.5%) [59]. The lower prevalence indicates that students’ decreased use of stimulant drugs for academic purposes and an increase in their awareness of the side effects of stimulant drugs. Furthermore, the variation could be related to the difference in the sample size.

The result of the multivariable generalized linear mixed model showed that recent use of alcohol was associated with individual and contextual level determinants. But recent use of cannabis and stimulant drug were only associated with individual-level factors.

Concerning in recent use of alcohol, being male, following education as a working student, being over 30 years old, following a master's degree program, and lifetime use of cigarettes were statistically significant individual-level variables (p<0.05). In addition, independently living from parents was an important contextual level variable that had higher odds of alcohol use (p<0.05). By keeping other and cluster variables constant, males were 1.77 times more likely to be combined risky and low-risk drinkers vs. non-drinkers than females. Higher rates of alcohol consumption among males could be linked to increased peer alcohol use [60]. Students above the age of 30 were 55% less likely to be combined risky and low risk drinkers versus non-drinkers than those under 20 years. Our finding is in parallel with the study conducted in Italy, in which with the advancement of age, risky consumption becomes less likely [51]. This could be related to increasing students’ awareness of the negative consequences of excessive alcohol consumption as they mature. When students reach the age of 30, they might enter into social roles such as marriage, which will take responsibility for their families [61]. This finding also in parallel with another study conducted in the United Kingdom [62]. In addition, this finding is supported by previous studies conducted at the University of Michigan, which revealed that most reasons for drinking reduce as age increases [63]. But our findings disagree with the study conducted in Belgium and South Africa [64], in
which as age increases, the consumption of alcohol among university students is increased. By keeping cluster and other variables constant, students who followed their education as working students had 1.54 times the odds of being combined risky and low-risk drinkers versus non-drinkers as compared to non-working students. This finding is consistent with previous studies [65]. Working students have stress because of workload, and they are motivated to consume alcohol to alleviate it [66, 67]. In addition, it could be associated with the availability of money. By keeping the cluster and other variables constant, the odds of being a combined low and risky drinker versus non-drinker increased by 4.07 times for lifetime smokers compared to non-smokers. This finding is also in parallel with previous studies, which found that the use of cigarettes is an important risk factor for alcohol intake [64, 68-70]. This could be associated with the fact that exposure to smoking increases the probability of use of alcohol dependence [71]. It is also an indication of the presence of a high relationship between the use of cigarettes and alcohol intake [68, 72]. Furthermore, some studies show that cigarette smoking is a major predictor of alcohol dependency [69, 73]. Compared to students who followed bachelor's degree, master's students had greater odds of being risky and low-risk drinkers (OR = 1.70). Our finding disagrees with previous reports [74-76], in which lower educational level was found to be associated with a higher frequency of alcohol intake. Students who lived away from their parents had a higher likelihood of being recent alcohol users (OR = 1.71) than those who lived with their parents. The finding is consistent with previous findings [51, 64, 77]. This could be associated with living away from parental supervision and assistance, increasing the chance of high alcohol intake [51, 77].

In the full multivariable generalized linear mixed-effect model, among individual-level risk factors, gender, age, lifetime cigarette smoking, and type of training students followed were found to be statistically significant (P<0.05) for the recent use of cannabis. The odds of being a recent cannabis user among males were lower by 37% than among females. This finding is in parallel with Karlsson et al. [78] and is not in line with another study from Sweden [79]. It could be associated with the fact that the use of cannabis has become voguish among female students [80]. Across age categories, the odds of being a recent cannabis user increased for students in the age group between 26 and 30 years. The study is in parallel with other reports [81, 82] and is also supported by previous findings in Canada [83], in which the use of cannabis has increased among adult students. The odds of being a recent cannabis user among lifetime cigarette smokers were 43% lower than those of non-smokers. The finding is inconsistent with previous reports [84-87], and cigarette smoking and cannabis use are frequently found together [88]. The variation of the study might be associated with students' getting the required satisfaction from cigarettes. In addition, the price of cigarettes is lower than that of cannabis. Students who followed a master's degree and other programs were more likely to be cannabis users as compared to those who followed a bachelor degree. This could be associated with delayed preparation for the exam period, making them stressed. To make them relax, students might smoke cannabis [89].

The result of the multivariable generalized linear mixed effect model with individual-level risk factors revealed that the odds of being a recent stimulant drug user for master's students were 60% less likely to be than for those who followed a bachelor's degree. This could be associated with an increased understanding of the side effects of the drug, such as increases in heart rate, blood glucose and blood
pressure [90]. The previous findings also suggested that mental factors such as depression [91, 92], anxiety [93], and stress [94] are important factors for the use of stimulants drugs.

The estimated value of Median odds ratio for recent use of alcohol, cannabis, and stimulant drugs was greater than one in the final full model, indicating the presence of strong faculty effects in the prevalence of recent alcohol consumption, use of stimulant drugs, and cannabis use among students. In a null, individual, contextual, and full level model, a student from a high-risk faculty was 31, 11, 32 and 11% more likely to be recent alcohol user than a student from a low-risk faculty, respectively. Regarding the recent use of cannabis, when individuals from a faculty of low risk were compared to a faculty of high risk, the odds of students being cannabis users in all models were above one (1.28-1.32). Moreover, for students from a faculty of low risk compared to a faculty of high risk, the probability of using stimulant drugs in null, individual, contextual, and full-level models was more than doubled. In multi-level modeling, computing MOR is a more epidemiologically appropriate method for estimating variances and explaining the cluster level variance in terms of odds ratio [95].

A proportional change in variance between the models was estimated for the three outcomes. The results showed that 83.54% of the variability in recent use of alcohol in the full model was explained by both individual and contextual level variables. The final full model of recent use of cannabis had a percentage change in variance (PCV) of 20.93%, indicating that individual and contextual level variables together explained about 20.93 % of the variation in recent use of cannabis among students. When observing the recent use of stimulant drugs, -38.32 % of the individual stimulant drug use variability in the full model was explained due to the differences in students’ faculty rather than a difference in other contextual and individual level factors. There is one report done in Flemish medical schools in which medical students used stimulant drugs more frequently due to the presence of high competition and stress [36]. Our study supports the importance of applying multilevel modeling for this study and the role of fixed effects factors in explaining the variation in the prevalence of substance use. Anderson [96] and Katz [97] also supported the idea that including potential factors in multilevel models is very important for the estimation of the actual variance of random effect variable.

This study has some limitations and strengths. Firstly, the study was a cross-sectional survey that could not infer the causal association between outcome and predictor variables. Secondly, an online self-reported questionnaire is prone to recall and socially desirable bias. Thirdly, apart from educational level, there is a lack of information on the socioeconomic status of parents and the substance use history of parents. Regarding the strength of the paper, both individual and contextual factors were discussed. The large sample size and the use of validated measurement tools (AUDIT-C) are additional strong points of the paper.

Conclusions

The prevalence of recent use of alcohol among students was reported to be high. Whereas the prevalence of recent use of cannabis and stimulant drugs was reduced. In this study, some of the individual and
contextual level factors were found to have a significant influence on the recent use of alcohol, cannabis, and stimulant drugs. Those over the age of 30 years, males, working students, master's students, cigarette users at the individual level, and living independently from parents at the contextual level were important factors found to be associated with the recent use of alcohol. Concerning recent use of cannabis, students aged between 26 and 30 years, following master's and other programs, and cigarette users were important individual-level risk factors. There was no identified risk factor in association with the recent use of stimulant drugs in the last twelve months before the start of the study. There was a greater faculty effect on the individual likelihood of using alcohol, cannabis, and stimulant drugs. Further investigation needs to clarify the importance of being a master's student for the recent use of alcohol. Furthermore, there should be further study on the lifetime use of cigarettes and being a master's student in association with the recent use of cannabis. Therefore, creating awareness and designing platforms to support interventions targeting high-risk groups may help to reduce substance use.

**Abbreviations**


**Declarations**

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**Authors contribution**

Asres Zegeye: Drafted proposal; data analyzed; paper written.

Professor Dr. Guido Van Hal: Draft project; proposal reviewer; paper reviewer.

**Availability of data**

The availability of the data for this paper will be provided as an additional file during manuscript submission. The data could be accessed by requesting from Professor Dr. Guido Van Hal.

**Conflict of interest**

No conflict of interest.
References


Results from project SNIPE. European Addiction Research 2021, 27(1):75–82.


Tables

Tables 1 to 4 are available in the Supplementary Files section

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

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