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FAMILY BACKGROUND AND SOCIO-DEMOGRAPHIC CORRELATES OF CANNABIS USE: A CROSS-SECTIONAL SURVEY OF UNIVERSITY STUDENTS IN BOTSWANA

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ABSTRACT

Globally, cannabis use is widespread, especially among young adults. Because it is linked to current and future health problems, cannabis use is a public health concern. Yet, little is known about the background of users. This study aims to assess familial and socio-demographic correlates of cannabis use in young adults. A cross-sectional survey of 371 students (mean age=21.8; ±1.76; 18-25; 56% female) was conducted at a university in Botswana. Data on socio-demographic characteristics, cannabis use, familial characteristics (drug and substance use and mental health problems) and norms were collected using self-report measures. Descriptive statistics, t-tests and regression analyses were performed to compute socio-demographic characteristics, sub-population differences, and the extent to which the different familial and socio-demographic correlates predicted cannabis use. Past month, past year and lifetime prevalence of cannabis use were 13.8%, 20.4%, 32.6%, respectively. Male students significantly used more cannabis than their female peers. Similarly, cannabis use was significantly more prevalent and widespread among tobacco and alcohol users than nonusers and among participants and peers who approved of cannabis use. Gender, alcohol and cigarette smoking, personal and peer approval, personal history of mental health problems, and sibling's use of cannabis significantly and uniquely predicted cannabis use. Cannabis use is widespread among young adults, especially among alcohol and cigarette smokers and in dysfunctional family contexts fraught with drug and substance abuse and mental health problems. The government and other stakeholders should prioritise a holistic public health approach that targets vulnerable families and prevailing norms among young adults. Improvement in health services to meet education, screening and treatment needs is recommended.

Keywords: Cannabis use; young adults; familial factors; norms; Botswana

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INTRODUCTION

Cannabis (also known as marijuana or dagga), is the most frequently used illicit drug, especially among young people in high schools and tertiary education institutions (Macleod, Oakes, Copello, et al., 2004; Peacock, Leung, Larney, et al., 2018; UNODC, 2018). Although cannabis is the preferred drug of choice for leisure activities among young adults, its long-term use is associated with significant impairments and forms the basis for immediate and later physical and mental health problems (Bechtold, Simpson, White, & Pardini, 2015; Macleod, Oakes, Copello, et al., 2004; Peacock, Leung, Larney , et al., 2018; UNODC, 2018; Volkow, Swanson, Evins, et al., 2016). The physical and health problems linked to long-term cannabis use include cancer, respiratory problems, high blood pressure and metabolic problems (British Lung Foundation, 2012; Tashkin, 2013; Sidney, 2002; Vidot et al., 2015). For mental health, cannabis use has been linked to poor cognition, particularly slow learning and poor memory, attention, and working memory problems (Volkow, Swanson, Evins, et al., 2016). Other studies have also linked cannabis use to smaller brain volumes in the prefrontal cortex and the hippocampus, brain regions responsible for cognitive function (Squeglia, Jacobus, & Tapert, 2009). Similarly, due to its effects such as perceptual alterations and cognitive distortions (Green, Kavanagh, Young, 2003), high doses of cannabis may result in psychotic symptoms like delusion and hallucinations, also known as cannabis-induced psychosis (Moore, Zammit, Lingford-Hughes, et al., 2007).

Despite the widespread use of cannabis and its harmful health effects, only a few studies have been conducted to quantify its use and assess the background of young adult users in low- and middle-income countries such as Botswana. Early adulthood is a critical developmental stage, during which many lifestyle habits are developed and established. Moreover, unhealthy lifestyle habits such as drinking, smoking, and illicit drug use start at this stage more than at any other developmental stages. The few studies carried out in Botswana have documented widespread use among adolescents and young adults in secondary schools and universities (Kgatitswe & Amone-P'Olak, 2017; Ludick & Amone-P'Olak, 2016; Riva, Allen-Taylor, Schupmann, et al., 2018). Over the years, the Botswana Police Service has seized enormous quantities of cannabis (UNODC, 2018) and concentrated much of its efforts on the supply side of cannabis without considering the demand side. This study aims to assess the background characteristics of cannabis users to design prevention programs to stem the use of cannabis, especially among adolescents and young adults. Despite the widespread use of cannabis in low- and middle-income countries, interventions to prevent and treat cannabis dependence and addiction are nearly non-existent.

Drug and substance use often occur within the context of a confluence of risk factors that young adults are exposed to from early on in life (Felitti et al., 2019; Mongale & Amone-P'Olak, 2019). For example, family backgrounds such as having adult family members (e.g., parents or siblings) who use drugs and substances (Ewing et al., 2015). Young adults may use cannabis to cope with stressful life events or mental illness (El Ansari, Sebena, & Labeeb, 2015; Hetolang & Amone-P'Olak, 2018; Kgatitswe & Amone-P'Olak, 2017;

Moitlakgola & Amone-P'Olak, 2015; Mongale & Amone-P'Olak, 2019).

Based on the gateway hypothesis (Kandel & Kandel, 2015), the use of alcohol and cigarette are known to precede the use of illicit drugs (Kandel, Yamaguchi, & Klein, 2006). Similarly, the social norms theory, commonly applied in drug and substance use studies, postulates that personal, peer, and family approvals of certain behaviours have a direct influence on drug and substance use behaviours (Berkley-Patton, Prosser, McCluskey-Fawcett, & Towns, 2003; Neighbors, Geisner, & Lee, 2008; Perkins, 2003). Therefore, drug and substance use thrive in dysfunctional family environments where adult members use drugs and substances and in family situations fraught with stress and conflicts, mental illness and enabling norms that promote drug and substance use. Grounded on both the gateway hypothesis and social norms theory, this study will test two hypo heses:

(i) Alcohol and cigarette smoking are associated with increased cannabis use.
(ii) Familial drug and substance use, history of mental health problems and norms that promote drug and substance use would be associated with increased cannabis use.

The present study assessed cannabis use among young adults at a university in Botswana. Specifically, the following objectives were pursued:

a) To determine the past month, past year and lifetime prevalence of cannabis use.
b) To examine the demographic characteristics (e.g., gender, age, etc.) and their associations with cannabis use.
c) To assess familial drug and substance use (maternal, paternal, and sibling drug use) and their associations with cannabis use.
d) To examine the familial history of mental health problems and their associations with cannabis use.
e) To examine norms (personal, peer, and parental norms) and their associations with cannabis use.

METHODOLOGY

Research Design and sample

The current study utilised a cross-sectional design. A sample of undergraduate students registered for various academic programs at a university in Botswana was conveniently drawn to participate in the study. In total, 371 young adults (56% females) aged between 18 and 25 years took part in the survey.

Data collection and ethical considerations

A questionnaire was used to collect data from lecture rooms with permission from lecturers who were earlier on contacted through the different faculty administrators. Two research assistants distributed 389 copies of questionnaire to students. Eighteen questionnaires were discarded because of incomplete information. The two research assistants stayed in the lecture rooms to respond to any queries from the respondents. The respondents took about 10 minutes to fill in the questionnaire. Before distributing the questionnaire, the research assistants explained the purpose of the study to respondents and their rights to withdraw at any time from participating in the study. Next, the respondents were guaranteed

anonymity and confidentiality before signing informed consent forms. After the respondents completed the forms, they were debriefed and informed of available psychological support services at the Psychology Clinic and the University Counselling Centre, should they require such support. Both the Psychology Clinic and the University Counselling Centre are located within the university. Permission to conduct this study was granted by the Institutional Review Board of the University of Botswana.

Measures

In this study, three different measures were used: first, a self-developed measure to assess socio-demographic characteristics (e.g., age, gender, academic performance using cumulative grade point average (CGPA), secondary school attended, parental educational attainment, etc.). Second, the prevalence of cannabis use (in the past month, past year and lifetime), familial drug and substance use (mother, father and sibling), familial history of mental health problems (family member and personal), and norms (individual, peer, and parental norms) were measured by one question each. Third and finally, daily cannabis use was assessed by the revised version of the Cannabis Used Disorder Identification Test (CUDIT-R: Adamson et al. 2010).

Socio-demographic characteristics: Participants were asked to report their gender, age, year of study, secondary school attended, CGPA, educational background of the mother and father.

CUDIT-R: The revised 8-item CUDIT-R scale was used to assess cannabis use. The scale consisted of items related to consumption, dependence, cannabis-related problems and psychological issues. CUDIT-R is a brief and easy-to-use scale often used to assess cannabis use in the past six months. Some of the items included: "How often do you use cannabis?" or "Have you ever thought of cutting down, or stopping your use of cannabis?" Responses to the questions were categorised as 0= "never" through to 4= "daily or almost daily" use. This questionnaire was designed for self-administration and is scored by adding each of the eight items: questions 1-7 are scored on a 0-4 scale, and question 8 is scored 0, 2 or 4. A score of 8 or more indicates hazardous cannabis use, while ratings of 12 or more indicate a possible cannabis use disorder for which further intervention may be required. The CUDIT-R showed good internal consistency and concurrent validity with other cannabis-related outcome measures, including DSM-5 criteria. In this study, the Cronbach Alpha reliability was acceptable at α=0.87.

Prevalence of cannabis use: prevalence of cannabis use was measured using three questions: "have you used cannabis (also known as marijuana or dagga) in the past 30 day", "have you used cannabis (also known as marijuana or dagga) in the past year" and "have you used cannabis (also known as marijuana or dagga) in your lifetime". All the questions were dichotomously scored "yes" (=1) for the occurrence or "no" (=0) for non-occurrence. Prevalence of cannabis use was indicated by the frequency counts for occurrence in the past 30 days, past year and lifetime.

Familial drug and substance use: Three questions were used to assess familial drug and substance use: 1) "Did any of

your siblings (brother and or sister) use cannabis (also known as marijuana or dagga), alcohol, or cigarette? 2) Did your father or male guardian use cannabis (also known as marijuana or dagga), alcohol, or cigarette? 3) Did your mother or female guardian use cannabis (also known as marijuana or dagga), alcohol, or cigarette? All the questions were dichotomously scored "yes" (=1) for the occurrence or "no" (=0) for non-occurrence. Familial drug and substance use were indicated by frequency counts for use of cannabis, alcohol and cigarette.

Familial history of mental health problems: To assess the familial history of mental health problems, we used two questions: "Is there or was there anyone in your family with a history of mental health problem" and "Have you ever had a history of a mental health problem? Again, both questions were dichotomously scored "yes" (=1) for occurrence or "no" (=0) for non-occurrence. Familial history of mental health problems was indicated by frequency counts of family and personal history of mental health problems. A score of one (1) or more was indicative of familial history or mental health problems.

Alcohol use: Alcohol use was measured with a single question: "Do you drink alcohol?" This question was also dichotomously scored "yes" (=1) for the occurrence or "no" (=0) for non-occurrence. Alcohol use was indicated by frequency counts for use and a score or one (1) was indicative of alcohol use.

Cigarette smoking: Cigarette use was measured with a single question: "Do you smoke cigarettes?" This question was also dichotomously scored "yes" (=1) for occurrence or "no" (=0) for non-occurrence. Cigarette smoking was indicated by frequency counts for use and a score or one (1) was indicative of cigarette smoking.

Norms: norms was assessed using three questions: "I disapprove peers of my age trying cannabis (also known as marijuana or dagga) once or twice", "Peers of my age disapprove of me trying cannabis (also known as marijuana or dagga) once or twice?" and "My parents or guardian disapprove of my trying cannabis (also known as marijuana or dagga) once or twice". This question was also dichotomously scored "yes" (=1) for occurrence or "no" (=0) for non-occurrence. A score of one (1) for each type of norm (personal disapproval, peer disapproval and parental disapproval) was indicative of each type of norm.

Statistical analyses

Descriptive statistics (e.g., mean, standard deviation and ranges) were used to compute the socio-demographic characteristics and the prevalence of cannabis use and familial characteristics. To assess gender differences, a t-test was used, and the results tabulated. To determine the relationship between cannabis use and family factors and background characteristics, univariable regression analyses were used. Next, multivariable regression analysis was performed to assess the unique influence of the socio-demographic, familial and personal background characteristics, and norms on cannabis use. Association between variables was statistically significant at a ***p***-value less than 0.05. All statistical analyses were carried out using IBM SPSS statistical software, version 26.0 (IBM Corp. Released 2019).

RESULTS

Socio-demographic characteristics

The socio-demographic characteristics of the study population are presented in Table 1. A total of 371 students (mean age =21.8; SD ± 1.76; 18-25; 56% female) participated in the study. Most of the participants grew up mainly in rural areas (45%, n=168) and the majority (54%, n=195) were in the second-class lower division of cumulative grade point average (CGPA). Similarly, most of the respondents indicated that they attended a public school (69%, n=257) with most of their parents having attended mostly tertiary education (Table 1).

Prevalence of cannabis use and drug and substance use

The past month, past year and lifetime prevalence of cannabis use was 13.8%, 20.4%, 32.6%, respectively (Table 2). Among those who use cannabis, about half use it hazardously (Table 2). Male students used cannabis significantly more than their female peers in the past month, past year, lifetime and on the CUDIT-R score (Table 2). Female participants reported more personal, peer and parental disapproval of cannabis use than their male counterparts while there was no gender difference in reporting personal and family history of mental health (Table 2). Again, familial drug and substance use (sibling, mother, and father) was reported by more male than female participants (Table 2). Similarly, cannabis use was significantly more prevalent and widespread among cigarette smokers and alcohol users than nonusers and among participants and peers who approved of cannabis use.

Table 1. Demographic characteristics of the study population

Variables	Total (*N*=371)
Age (M, SD, min, max)	21.8; ±1.76; 18-25
Gender	
Male	160 (43.6%)
Female	207 (56.4%)
Place of upbringing	
Cattle post	8 (2.2%)
Village	168 (45.4%)
Town	87 (23.5%)
City	107 (28.9%)
CGPA	
2.00-2.99	102 (28.1%)
3.00-3.99	195 (53.7%)
4.00-4.69	50 (13.8%)
4.70-5.00	16 (4.4%)
School attended	
Public	257 (69.3%)
Private	56 (15.1%)
Both	58 (15.6%)

M=mean; N=total sample; SD= standard deviation; min=minimum; max=maximum; %= per cent

Table 2. Sociodemographic characteristics of respondents and bivariate relations between variables in the study

Variables	Total *M, N* or *n*	*SD* or %	Male *M, N* or *n*	*SD* or %	Female *M, N* or *n*	*SD* or %	t-test (df=370)
Age	22.15	2.55	22.69	2.53	21.69	2.44	**3.75*** **
Alcohol use	137	35.4	66	39.1	69	32.7	**ns**
Cigarette smoking	51	13.2	35	20.8	16	7.5	**3.66*** **
Cannabis use							
Past 30 days	53	13.8	31	58.5	22	41.5	**2.27***
Past year	78	20.4	47	60.3	31	39.7	**3.11****
Lifetime	126	32.6	66	52.4	60	47.6	**2.23***
CUDIT-R scores							**5.23*** **
Score < 8	26	49.1	12	46.2	14	53.8	
Score ≥ 8 (hazardous use)	27	50.9	19	70.4	8	29.6	
Norms							
Personal disapproval	0.58	±0.49	0.53	±0.50	0.63	±0.48	**2.01***
Peer disapproval	0.59	±0.49	0.50	±0.50	0.66	±0.48	**3.14****
Parental disapproval	0.81	±0.39	0.77	±0.43	0.86	±0.35	**2.25****
Mental health problems (MHP)							
Family history of MHP	84	21.9	41	48.8	43	51.2	**ns**
Personal history of MHP	37	9.8	17	45.9	20	54.1	**ns**
Familial use of drugs							
Maternal use	63	16.4	37	58.7	26	41.3	**2.68****
Paternal use	123	32.6	66	53.7	57	46.3	**2.61****
Sibling use	103	27.3	62	60.2	41	39.8	**3.82*** **

Key: M=mean; N=total sample; n=subpopulation; SD= standard deviation; %= per cent; CUDIT-R= revised version of the Cannabis Use Disorder Identification Tool; ns=not significant; MHP= mental health problems; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Familial and socio-demographic predictors of cannabis use

The results of the univariable regression analyses of the influence of demographic factors (e.g., age, gender) and familial factors (drug and substance use, mental health and norms) are presented in Table 3. Overall, gender, personal history of mental health, familial drug and substance use, alcohol and cigarette smoking, and personal and peer norms of personal and peer disapproval significantly predicted cannabis use (Table 3). Each regression coefficient represents the number of standard deviation (*SD*) change in the dependent variable per *SD* change of the independent variable. For example, the regression of cannabis use on smoking cigarettes indicates that a change of 1 *SD* is associated with a 0.41 *SD* change in cannabis use. The regression model fits were significant and ranged from $R^2 = 0.02$ ($F_{(2, 370)} = 47.41$, $p < .05$) for personal history of mental health to $R^2 = 0.17$ ($F_{(2, 370)} = 78.64$, $p < .001$) for cigarette smoking. Cigarette smoking was the most significant predictor of cannabis use with the largest effect size (η^2=0.17).

Table 3. Results of univariable regression analyses (*N*=371)

Variables	β	95 % (CI)	η^2
Age	0.01	(-0.10, 0.13)	0.00
Gender	**0.26**	**(-0.36, -0.16)**	**0.07**
Maternal educational attainment	-0.03	(-0.13, 0.07)	0.00
Paternal educational attainment	0.06	(-0.04, 0.17)	0.00
Family history of mental health problems	0.05	(-0.16, 0.07)	0.00
Personal history of mental health problems	**0.12**	**(0.02, 0.22)**	**0.01**
Sibling use of cannabis	**0.22**	**(0.12, 0.32)**	**0.05**
Father's use of drugs and alcohol	**0.20**	**(0.10, 0.30)**	**0.04**
Mother's use of drugs and alcohol	**0.23**	**(0.13, 0.33)**	**0.05**
Drinking alcohol	**0.31**	**(0.21, 0.40)**	**0.10**
Cigarette smoking	**0.41**	**(0.32, 0.51)**	**0.17**
Personal disapproval of cannabis use	**-0.17**	**(-0.27, -0.07)**	**0.03**
Peer disapproval of cannabis use	**-0.16**	**(-0.26, -0.06)**	**0.03**
Parental disapproval of cannabis use	-0.05	(-0.15, 0.06)	0.00

Key: **β**: standardized beta; **CI**: confidence interval, **η^2**: eta squared (a measure of effect size). All significant associations are in bold.

Multivariable regression results of the influence of familial and socio-demographic correlates on cannabis use

The results of the multivariable regression models to assess the correlates that independently and uniquely predicted cannabis use in the multivariable regression models are presented in Table 4. The results indicated that 'female (relative to male) gender', 'alcohol use', 'cigarette smoking', maternal use of drugs and substances', 'peer approval', 'personal history of mental health', and 'sibling's use of drugs and substances' uniquely predicted depression (Table 4). The regression model yielded a significant fit at $R^2 = 0.26$ ($F_{(9, 363)} = 13.27$, $p < .001$) helping to explain 26% of the variance in cannabis use (**η^2**=0.26).

DISCUSSION

The current study examined family and socio-demographic correlates of cannabis users in a sample of young adult students at a university in Botswana. Cannabis use was significantly more common

Table 4. Multivariable regression analyses

Variables	β	95 % (CI)	η^2
Gender	0.19	(0.09, 0.29)	0.26
Alcohol use	0.19	(0.09, 0.28)	
Cigarette smoking	0.26	(0.16, 0.35)	
Peer disapproval	-0.12	(-0.23, -0.02)	
Personal history of mental health	0.11	(0.01, 0.21)	
Siblings use of cannabis	0.13	(0.02, 0.23)	

Key: **β=** beta, **CI**= Confidence Interval, **%**= per cent

and widespread among male students, cigarette and alcohol users, students with a personal history of mental health and family contexts where drug and substance use are rife (Table 3). Norms such as individual and peer disapproval of drug and substance use negatively predicted cannabis use. In the end, male (relative to the female) gender, alcohol use, cigarette smoking, peer disapproval, personal history of mental health problems, and sibling's use of cannabis, uniquely and significantly predicted cannabis use (Table 4). Cigarette smoking and alcohol us, both gateway drugs, were associated with increased cannabis use in consonant with the gateway hypothesis (Kandel & Kandel, 2015; Kandel, Yamaguchi, & Klein, 2006). Similarly, familial drug and substance use, history of mental health problems and norms that promote drug and substance use were associated with increased cannabis use just as postulated by the social norms' theory (Berkley-Patton, Prosser, McCluskey-Fawcett, & Towns, 2003; Neighbors, Geisner, & Lee, 2008; Perkins, 2003).

The possible practical, policy and research implications of the findings of cannabis use are discussed below. Cannabis use was significantly more widespread among cigarette and alcohol users compared to nonusers. For example, the prevalence of cannabis use in the past month among current alcohol users was 25%, nearly four times more than that in nonusers at 7%. Similarly, the prevalence of cannabis use in the past month was 10% among non-cigarette smokers but 39% in cigarette smokers. This finding is consistent with the gateway hypothesis (Kandel & Kandel, 2015; Kandel, Yamaguchi, & Klein, 2006) where the use of alcohol and cigarette precedes the use of other illicit drugs such as cannabis. As cigarettes and alcohol become more expensive, and the global trend to legalise cannabis gain momentum around the world, its use, especially among young adults, will become even more popular. This trend is particularly concerning because 10% of regular cannabis use leads to dependence, doubles the risk of school drop-out and later cognitive impairment and psychoses (Hall, 2015; Moore, Zammit, Lingford-Hughes, et al., 2007). Similarly, cannabis use increases the risk of later cardiovascular disease in adulthood (Jouanjus et al., 2014; Thomas, Kloner, & Rezkalla, 2014). Given these elevated health risks associated with cannabis use, health-care practitioners should consider expanding infrastructure for diagnosis and treatment of cannabis dependence and addiction besides training more social workers and addiction experts to tackle the creeping cannabis epidemic, especially in low- and middle-income countries.

The finding that personal history of mental health problems was associated with cannabis use corroborates previous findings (Bechtold, Simpson, White, & Pardini, 2015; Hall, 2015; Kgatitswe & Amone-P'Olak, 2017) and underscores the importance of tackling mental health problems during adolescence and early adulthood. Moreover, most of the young adults who indulge in cannabis use come from dysfunctional family backgrounds where drug and substance use thrive (Chivandire & January, 2016) and where there is a high density of stressors. These stressors may include poverty, domestic violence, sexual abuse, and single-parent families (Maundeni, 2000; Mokoodi, 2004; Philip & Amone-P'Olak, 2019). Consequently, to tackle cannabis dependence and addiction, practitioners should

consider family-based therapy (Horigian, Anderson, & Szapocznik, 2016). The findings regarding the norms lend support to the social norms' theory where personal, peer and family disapprovals directly influence on drug and substance use behaviours (Berkley-Patton, Prosser, McCluskey-Fawcett, & Towns, 2003; Neighbors, Geisner, & Lee, 2008; Perkins, 2003). The family, especially parents and older siblings, play a vital role in preventing or exacerbating cannabis use among young adults.

Future longitudinal research should be considered to disentangle and clarify relationships among various familial and socio-demographic correlates of cannabis use. Policies that help to support and strengthen the family, such as employing social workers to work in rural settings, youth clubs to engage the youth in sporting activities and talent development, are critically important. The legalisation of cannabis for medical use should also be handled with care as many adolescents, and young adults may not easily differentiate between medical use and recreational use of cannabis. Further education may help to distinguish the various usages of cannabis.

Several limitations should be considered before making inferences about the findings of this study. First, the use of cross-sectional survey in this study does not allow causal inferences. Future studies should consider using longitudinal designs to determine the trajectory of cannabis use in adolescents and young adulthood. A social ecology model that considers personal, peer, family, community, and societal contextual factors should be considered (Bronfenbrenner, 1979). Second, participants in this study were conveniently drawn from a sample of university students who may be subculturally different from out-of-school youth. As a result, the findings cannot be extrapolated to out-of-school adolescents and young people, who often come from more poverty-stricken and dysfunctional family backgrounds than their counterparts who study at the universities. Convenient sampling might have also introduced some bias in the study. Finally, data for this study were obtained using self-report measures which are often prone to bias such as over-reporting, under-reporting or social desirability. This might have influenced the integrity of our results. Notwithstanding the limitations outlined above, the findings of this study is a precursor to further studies on the correlates of cannabis use, particularly among young adults.

CONCLUSIONS

The results of this study indicate that cannabis use is widespread, especially among alcohol and cigarette smokers and in family contexts fraught with mental health and drug and substance abuse problems (Mongale & Amone-P'Olak, 2019) besides holding norms that promote cannabis use. Compared to non-cigarette and non-alcohol users, cannabis users are more than three times as likely to use cannabis. Drug and substance use among adolescents and young adults should be an important public health priority considering its persistent associations with risky sexual behaviours, aggression, traffic accidents and injury, and other health conditions (Shisana et al., 2014). Because cannabis use is associated with poly-drug use, efforts to reduce its use should have a holistic public

health approach that targets vulnerable families and sub-population of adolescents and young adults with norms that promote the use of other drugs such as cigarettes and alcohol. Government and other stakeholders such as universities, should prioritise programmes to improve health services to meet education, screening, and treatment needs of vulnerable young adults, particularly those from dysfunctional family backgrounds. The findings in this study suggest that it is imperative to address mental health problems during adolescence and early adulthood along with efforts to reduce drug and substance use in the subpopulations of adolescence and early adulthood. Further studies are urgently required on the effects of cannabis use on other domains of adolescent and early adult life such as cognitive functioning, changes in brain function and structure, academic and work-related failure, mental health, violent and criminal behaviour, motor vehicle accidents, and suicidal behaviours.

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