Associations between Cannabis Use and Multiple Substance Use among High School Students in Jamaica

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ABSTRACT

Objective: Cigarettes, alcohol, cannabis, inhalants and cocaine are the most commonly used substances among high school students in Jamaica. However, there is limited evidence on their co-use and whether the use of one drug predicts the use of the others (multiple substance use). This study aimed to determine whether cannabis use predicts the co-use of the other substances.

Methods: We analysed data from the National Secondary School Survey 2013, Jamaica, using inferential statistics to determine associations.

Results: Lifetime cannabis use was significantly associated with lifetime cigarette use for males ($X^2 = 282.72$, p = 0.000) and females ($X^2 = 434.32$, p = 0.000). Similarly, it was significantly associated with: (a) lifetime use of alcohol for males ($X^2 = 88.62$, p = 0.000) and females ($X^2 = 99.48$, p = 0.000); (b) lifetime use of inhalants for males ($X^2 = 13.28$, p = 0.00) and females ($X^2 = 49.56$, p = 0.00); and (c) lifetime cocaine use for males ($X^2 = 9.78$, p = 0.00) and females ($X^2 = 64.54$, p = 0.00). Past-month (recent) use of cannabis was significantly associated with past-month use of cigarettes and alcohol, but not inhalants, for males and females. Logistic regression results showed that lifetime cannabis use was a risk factor for lifetime use of cigarettes (adjusted odds ratio [AOR]: 11.38; 95% confidence interval [CI]: 9.02, 14.37) and alcohol (AOR: 5.84; 95% CI: 4.11, 8.30), but a strong protective factor against lifetime use of inhalants and cocaine. Past-month use of cannabis was a strong protective factor against past-month use of cigarettes and alcohol.

Conclusion: Lifetime cannabis use was significantly associated with multiple substance use and was shown to be a risk factor for lifetime use of cigarettes and of alcohol. However, adolescents who reported recent (past-month) use of cannabis were less likely to report recent use of alcohol and cigarettes. These findings suggest the need for research to further explore the role cannabis plays in multiple drug use and offer more concrete explanations for its role.

Keywords: Associations, cannabis use, drug use, high school students

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Asociaciones entre Uso de Cannabis y Sustancias Múltiples entre Estudiantes de Secundaria en Jamaica

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RESUMEN

Objetivo: Cigarrillos, alcohol, cannabis, inhalantes y cocaína son las sustancias más común-mente usadas entre los estudiantes de secundaria en Jamaica. Sin embargo, son limitadas las evidencias sobre el consumo conjunto de tales sustancias, así como sobre si el uso de una droga predice el uso de las otras (uso de sustancias múltiples). Este estudio tuvo como objetivo determinar si el consumo de cannabis predice la co-utilización de las otras sustancias.

Métodos: Se analizaron los datos de la Encuesta Nacional de Escuela Secundaria 2013, Jamaica, utilizando estadísticas inferenciales para determinar las asociaciones.

Resultados: El uso de cannabis de por vida se asoció significativamente con el uso de cigar-rillos de por vida en caso de los varones ($X^2 = 282.72$, p = 0.000) y las hembras ($X^2 = 434.32$, p = 0.000). Asimismo, se asoció significativamente con: (a) el uso de por vida de alcohol en los varones ($X^2 = 88.62$, p = 0.000) y las hembras ($X^2 = 99.48$, p = 0.000); (b) el uso de por vida de inhalantes en los varones ($X^2 = 13.28$, p = 0.00) y las hembras ($X^2 = 49.56$, p = 0.00); y (c) el uso de la cocaína de por vida en los varones ($X^2 = 9.78$, p = 0.00) y las hembras ($X^2 = 64.54$, p = 0.00). El uso de cannabis el mes pasado (reciente) se asoció significativamente con el uso de cigarrillos y alcohol en hombres y mujeres el mes pasado, pero no ocurrió lo mismo con los inhalantes. Los resultados de la regresión logística mostraron que el consumo de can-nabis de por vida era un factor de riesgo para el consumo de cigarrillos de por vida (odds ratio ajustado [AOR]: 11.38; intervalo de confianza [IC] 95%: 9.02, 14.37) y el alcohol (AOR: 5.84; 95% IC: 4.11, 8.30), pero un factor fuerte de protección frente al uso de inhalantes y cocaína de por vida. El consumo de cannabis del pasado mes fue un fuerte factor de protección frente al consumo de cigarrillos y alcohol del pasado mes.

Conclusión: El consumo de cannabis de por vida se asoció significativamente con el consumo de sustancias múltiples y demostró ser un factor de riesgo para el consumo de por vida de cigarrillos y alcohol. Sin embargo, los adolescentes que reportaron el uso reciente de cannabis (el pasado mes) mostraron menor probabilidad de reportar el uso reciente de alcohol y cigar-rillos. Estos hallazgos sugieren la necesidad de investigación para profundizar en el papel que el cannabis juega en el uso múltiple de drogas y ofrecer explicaciones más concretas sobre su papel.

Palabras clave: Asociaciones, uso de cannabis, uso de drogas, estudiantes de secundaria

INTRODUCTION

Substance use is a serious public health problem in the Caribbean and, more specifically, Jamaica (1). Globally, the three most commonly used substances are alcohol, tobacco and cannabis (2–4). By 2017, globally, for all ages, lifetime alcohol consumption among the respond-ents to the Global Drug Survey was 98.7%, cannabis use 77.8%, tobacco 63.1% and tobacco with cannabis 55.0%. Among the same global sample, last-year preva-lence was equally very high: alcohol (94.1%), cannabis (60.0%), tobacco (47.6%) and tobacco with cannabis [38.3%] (2).

Notably, the adolescent and youth age group is dis-proportionately affected by substance use, and this is the demographic group usually found in high schools (5–7). In the Caribbean, studies have shown that substance use

among adolescents/high school students is also a serious public mental health problem (3, 8–10). Cannabis, alcohol, cigarettes and inhalants were the most commonly used substances among high school students in Jamaica (3, 8, 9). In 2013, the lifetime prevalence of substance use among high school students was 64% for alcohol, 20.17% for cannabis, 27.5% for cigarettes and 13.3% for inhalants. Similar trends were observed for past-year prevalence and past-month prevalence (3).

Based on the patterns and prevalence of consumption of substances among high school students, multiple substance use seems common. There has been considerable interest in understanding the dynamics and relationships in the use of multiple substances (4, 11, 12). Efforts to explain a unidirectional sequence of multiple substance use has led to some researchers formulating the gateway theory, also known as the stepping stones theory (13, 14). However, there has been a lot of debate on which substance individuals start with and/or which drug predicts the use of other substances (14–17). Some researchers have argued that alcohol is the gateway drug, and individuals who used alcohol are more likely to go on and use cannabis and other substances (14, 16). Other researchers have argued that cannabis is the gateway drug and that it precedes, reinforces and supports the use of other substances (15, 17). In the context of this debate, it is argued that the more important issue is to understand what substances increase or reduce the risk of use of other substances either concurrently or consecutively (including later in life). Studies that investigate the role of substances in heightening or reducing the co-use of other substances are very scarce in the Caribbean, although such studies may be necessary in programme formulation and policy-making for control of drugs. Therefore, this present study aimed to assess whether cannabis use increases or reduces the risk of use of other substances among secondary school students in Jamaica.

SUBJECTS AND METHODS
This was a population-based, descriptive, cross-sectional survey, with data collected from 3365 randomly selected students from 38 secondary schools in Jamaica in 2013. In the randomly drawn study sites (the secondary schools), stratified random sampling was used to select students from the 8th, 10th, 11th and 12th grades to take part in the study. The Inter-American Uniform Drug Use Data System (SIDUC) questionnaire was completed by each respondent.

The study conformed to international best practices. The University Hospital of the West Indies/The University of the West Indies, Mona, Faculty of Medical Sciences Ethics Committee approved the study. Further, the Ministries of Education and Health gave permission for the study to be conducted. Each school principal had permission for the study to be carried out. Written informed consent was obtained from both the parents and students. Students were advised not to write their names on the questionnaires. Other measures of anonymity and confidentiality were put in place, and the responses were practically untraceable to any individual respondent.

Mean and standard deviation were computed for continuous variables while frequencies and percentages were computed for categorical variables. Bivariate analysis was done using Pearson's Chi-square, but Yates corrected Chi-square was used where the requirements for Pearson's Chi-square were not met. Binary logistic regression was performed to assess for risk and/or protective factors. Statistical significance level was set at $p < 0.05$ (or 95% confidence interval for logistic regression).

RESULTS
Table 1 shows the students' sociodemographic characteristics and relationships with their parents and school teachers. The mean age of the students was 14.97 years (standard deviation: 1.71 years), with a slight difference between male and female students. Among all students, most were in public (government) schools, with only 2.1% of the students in private schools. Male and female proportions in public and private schools were very similar to the proportions seen for all students. The proportion of students (total, and males *versus* females) was highest in the 8th and 10th grades. Approximately 37% of male students and 34% of female students reported very good relationships with their fathers/guardians, compared to 63.4% of male students and 59.9% of female students who reported very good relationships with their mothers/guardians. Only 29.6% of male students and 29.1% of female students had very good relationships with their school teachers.

Table 2 displays the bivariate analysis results of the association between lifetime use of cannabis and co-use of cigarettes, alcohol, inhalants and cocaine. Lifetime use of cannabis was significantly associated with lifetime use, past-month (recent) use and past-year (chronic) use of cigarettes and alcohol for both male and female students. Lifetime use of cannabis also had

Table 1:   Key sociodemographic characteristics and relationships with parents/guardians and teachers of high school students in Jamaica, 2013

	All participants (3365)*	Male participants (1426)	Female participants (1915)
Key characteristics	**n (%)**	**n (%)**	**n (%)**
Age, mean (standard deviation)	14.97 years (1.71 years)	15.10 years (1.71 years)	14.88 years (1.71 years)
Type of school			
Public	3295 (97.9)	1383 (97.0)	1888 (98.6)
Private	70 (2.1)	43 (3.0)	27 (1.4)
Grade level at school			
8th grade	1037 (30.8)	426 (29.9)	605 (31.6)
10th grade	1109 (33.0)	462 (32.4)	637 (33.3)
11th grade	888 (26.4)	412 (28.9)	469 (24.5)
12th grade	331 (9.8)	126 (8.8)	204 (10.7)
Relationship with father/guardian*			
Very good	1181 (35.1)	523 (36.7)	651 (34.0)
Good	1254 (37.3)	543 (38.1)	705 (36.8)
Bad	378 (11.2)	158 (11.1)	218 (11.4)
Very bad	291 (8.6)	95 (6.7)	196 (10.2)
Not applicable	153 (4.5)	54 (3.8)	97 (5.1)
Relationship with mother/guardian*			
Very good	2063 (61.3)	904 (63.4)	1148 (59.9)
Good	935 (27.8)	376 (26.4)	556 (29.0)
Bad	156 (4.6)	55 (3.9)	100 (5.2)
Very bad	86 (2.6)	31 (2.2)	54 (2.8)
Not applicable	31 (0.9)	9 (0.6)	20 (1.0)
Relationship with teachers*			
Very good	987 (29.3)	422 (29.6)	557 (29.1)
Good	1303 (38.7)	543 (38.1)	755 (39.4)
Average	853 (25.3)	342 (24.0)	507 (26.5)
Bad	76 (2.3)	40 (2.8)	34 (1.8)
Very bad	57 (1.7)	329 (2.2)	25 (1.3)

* Some data were missing and so values may not add up to the total and percentages may not add up to 100.

a significant association with lifetime use and past-year use of inhalants and cocaine for male and female students, but surprisingly a non-significant association with past-month use of inhalants for male ($X^2 = 1.47$, $p = 0.23$) and female ($X^2 = 1.27$, $p = 0.40$) students and with past-month use of cocaine for male students only (Yates corrected $X^2 = 0.44$, $p = 0.51$).

Table 3 shows the results of multivariate binary logistic regression analysis of the association between cannabis use and lifetime use of cigarettes, alcohol, inhalants and cocaine. Lifetime use of cannabis significantly increased the risk of lifetime use of cigarettes (adjusted odds ratio [AOR]: 11.38; 95% confidence interval [CI]: 9.02, 14.37) and lifetime use of alcohol (AOR: 5.84; 95% CI: 4.11, 8.30). On the contrary,

lifetime use of cannabis was found to have a significant inverse association with lifetime use of inhalants (AOR: 0.46; 95% CI: 0.36, 0.61) and with lifetime cocaine use (AOR: 0.04; 95% CI: 0.02, 0.07).

Past-month (recent) use of cigarettes, alcohol, inhalants and cocaine was regressed on past-month use of cannabis in a different model, but the result is included in Table 3. The result shows that after adjustments for sociodemographic characteristics and relationships with parents/teachers, past-month use of cannabis was significantly inversely associated with past-month use of cigarettes and alcohol. Inconclusive (error) results were obtained for inhalants and cocaine due to the very small number of students who used the two substances in the past 30 days.

Table 2:   Associations between cannabis use and multiple substance use among high school students in Jamaica, 2013, by gender

Use of other substances*	Lifetime use of cannabis*					
	Males (n = 1426)			Females (n = 1915)		
	n (%)	Chi-square	*p*	n (%)	Chi-square	*p*
Cigarettes						
Lifetime use	209 (14.7)	282.72	0.000	225 (11.7)	434.32	0.000
Past-month use	32 (2.24)	13.60**	0.000**	44 (2.30)	28.74	0.000
Past-year use	93 (6.5)	53.17	0.000	95 (5.0)	46.01	0.00
Alcohol						
Lifetime use	260 (18.2)	88.62	0.000	276 (14.2)	99.48	0.00
Past-month use	72 (5.0)	9.47	0.000	71 (3.7)	26.16	0.000
Past-year use	157 (11.0)	36.36	0.00	151 (7.9)	15.34	0.000
Inhalants						
Lifetime use	45 (3.2)	13.28	0.00	72 (3.8)	49.56	0.00
Past-month use	7 (0.5)	1.47**	0.23**	16 (0.8)	1.27	0.40
Past-year use	17 (1.2)	5.59	0.01	34 (1.8)	10.82	0.00
Cocaine						
Lifetime use	10 (0.7)	9.78**	0.00	16 (0.8)	64.54**	0.00**
Past-month use	5 (0.4)	0.44**	0.51**	6 (0.3)	9.76**	0.00**
Past-year use	11 (0.8)	21.66**	0.000**	7 (0.4)	10.35**	0.00*

* Yes *versus* no
** Yates corrected Chi-square and *p*

Table 3:   Adjusted odd ratios* of the associations between cannabis use and co-use of cigarettes, alcohol, inhalants and cocaine among high school students in Jamaica, 2013

Explanatory variable	Cigarettes		Alcohol		Inhalants		Cocaine	
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Cannabis use								
Lifetime use[a, b]	11.38	9.02, 14.37	5.84	4.11, 8.30	0.46	0.36, 0.61	0.04	0.02, 0.07
Past-month use[c, d]	0.09	0.04, 0.21	0.19	0.11, 0.34	–	–	–	–

AOR = adjusted odds ratio, 95% CI = 95% confidence interval.
* Adjusted for sociodemographic factors (age, gender, relationship with father/guardian, relationship with mother/guardian) and school factors (type of school, grade level/form, relationship with teachers).
[a] Comparison group: students who answered 'No' to lifetime cannabis use.
[b] Lifetime use of cigarettes, alcohol, inhalants and cocaine was regressed on lifetime use of cannabis.
[c] Comparison group: students who answered 'No' to past-month cannabis use.
[d] Past-month use of cigarettes, alcohol, inhalants and cocaine was regressed on past-month use of cannabis.

DISCUSSION

Lifetime use of cannabis had a positive association with lifetime use of cigarettes, alcohol, inhalants and cocaine for both males and females in bivariate analysis. This suggests that young persons who had ever used cannabis were more likely to use the other four substances than those who had never used cannabis. This is consistent with other findings that cannabis use increases the risk of use of other substances (15, 17, 18).

After adjusting for sociodemographic variables and relationships with fathers, mothers and teachers in multivariate logistic regression, students who reported lifetime use of cannabis had higher risks of ever using cigarettes and alcohol, but significantly reduced risks of ever using inhalants and cocaine compared to students who had never used cannabis. The finding in the present study that lifetime cannabis use was a risk factor for lifetime alcohol consumption and cigarette use is corroborated by findings from other studies that reveal that cannabis use is associated with an increased risk of use of other substances (4, 15, 17).

On the other hand, studies have reported that substance use is influenced by several factors, thus adjusting for these factors might modify the strength of statistical associations and significance levels (19–21). Therefore, it is not surprising that after adjusting for sociodemographic variables and relationships with parents and teachers, cannabis use was no longer a risk factor for lifetime use of inhalants and cocaine in this present study.

Interestingly, those adolescents who reported recent (past-month) use of cannabis were less likely to report recent use of cigarettes and alcohol. The reason for this finding was unclear and suggests the need for further research to elucidate it. Nevertheless, some studies have documented that cigarette use may substitute for cannabis use, thereby reducing cannabis consumption (22). Then, it is possible that by the same unknown mechanism, cannabis use (recent use) may substitute for cigarette smoking and alcohol consumption as found in this present study. Another plausible explanation is related to the experience of symptoms during attempts to quit substance use. Some studies have reported that withdrawal symptoms are more severe if individuals are attempting to quit multiple substances concurrently than consecutively (23). Again, the reason for this finding is unclear, and more detailed exploratory qualitative studies and/or prospective, longitudinal studies are needed to investigate it further.

Strengths and limitations
One of the strengths of this study is that it used a nationally representative sample, with a large sample size, to assess the association between cannabis use and co-use of other drugs, and tested if cannabis use increased or decreased the risk of use of alcohol, cigarettes, inhalants and cocaine. Additionally, this study is one of the first to assess if the use of one substance predicts the use of others in Jamaica specifically and in the broader Caribbean region.

However, the study has some limitations. Firstly, it was based on secondary data collected from a cross-sectional survey. Therefore, the usual caveats associated with the use of secondary data apply to this study. Secondly, since the study was based on cross-sectional secondary data, it was not possible to establish the temporal sequence of the use of the substances. However, other studies have also used cross-sectional, secondary data to examine the co-use of substances (24, 25). Thirdly, past-year use of cannabis was not used in logistic regression to assess if it was a risk or protective factor against the use of the other substances. Additionally, the very low number of respondents who used cocaine and inhalants might have brought about errors in the logistic regression models.

CONCLUSION
The current study highlighted findings on how cannabis use was related to the use of cigarettes and alcohol. Lifetime use of cannabis had a positive association with lifetime use of cigarettes, alcohol, inhalants and cocaine for both males and females in bivariate analysis. On the contrary, past-month (recent) use of cannabis significantly reduced the risk for past-month use of cigarettes and alcohol. These findings suggest the need for research to explore further the role cannabis plays in multiple drug use and offer more concrete explanations for its role.

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