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Prevalence and Associated Factors of Alcohol and Cigarette Use among Peruvian Adolescents

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ABSTRACT

Purpose: This study aimed to identify the prevalence of alcohol and cigarette use and assess its relationship with socio-environmental, psychological, violent and behavioral factors among a sample of high school students from Lima and Callao, Peru. **Methods:** We utilized the data from a cross-sectional study conducted by the Yonsei Global Health Center in collaboration with the Korea International Cooperation Agency (KOICA) Peru office in November 2016. The total sample size of this study was 1,477 students. For analysis, we used bivariate and multivariate logistic regression to calculate the unadjusted and adjusted odds ratios and their respective 95% confidence intervals. **Results:** The current prevalence of alcohol and cigarette use among adolescents was found to be 24.2% and 12.1%, respectively. Alcohol use was affected by age, friends' alcohol use, experience of physical fighting, and involvement in other risk behaviors (smoking, drug use, and sexual intercourse). Cigarette use was affected by perceived academic performance, friends' cigarette use, and involvement in other risk behaviors (drinking, drug use, and sexual intercourse). Furthermore, students who received affection from their parents and whose parents monitored their activities were less likely to report using both alcohol and cigarettes. **Conclusion:** Alcohol and cigarette use among Lima and Callao adolescents is affected by socio-environmental, violent and behavioral factors. Alcohol and cigarette use prevention initiatives should promote positive parenting practices, family togetherness, and a supportive school climate. In addition, it is needed to establish peer-led programs that promote behavioral changes in students and strengthen social relations without the presence of alcohol, cigarettes, and other harmful substances.

Key Words: Alcohol use; Cigarette use; Global health; Adolescents; Peru

INTRODUCTION

1. Background

Alcohol and cigarette use have been identified as important risk factors for chronic disease, injury, and premature death [1-3]. In 2016, 5.3% of all global deaths, and 5.1% of global disability-adjusted-life-years were attributable to alcohol [2]; further, in 2015, 11.5% of global deaths were attributable to smoking, and this corresponded to a global loss of almost 150 million disability-adjusted-life-years [3].

Alcohol and cigarette use during adolescence are prominent public health problems worldwide. Studies have suggested that tobacco and alcohol consumption during this life stage increases the risk for negative outcomes even into adulthood, including premature death and the use, abuse of, and dependence on other harmful substances like illicit drugs [4].

In Peru, a recipient country of Korea's key Official Development Assistance (ODA), the minimum legal drinking and smoking age is 18 years old; nonetheless, they represent the most-consumed substances among adolescents. According to the last national study among adolescents conducted by Peru's National Commission for the Development and Life Without Drugs, in 2012, 9.3% and

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- Korea International Cooperation Agency (KOICA) under the title of "Lima and Callao, Peru, Health Promotion Program, 2014-2017 (Number P2013-00151-1)" in 2016.

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7.4% of high school adolescents reported drinking or smoking, respectively, during the previous month before the survey. In addition, the average age of initiation for both substances was 13.3 years old; however, 1 of each 4 students (25%) who reported life experience of either substance started between 8~11 years [5]. The mentioned national prevalences were greater than El Salvador and Bolivian adolescents for both substances in 2013 (alcohol, 7.6% and 3.2%; cigarette, 5.2% and 2.8% respectively); but similar in regards to the average early age of initiation [6,7]. The aforementioned is a factor which has been strongly associated with later problematic use and related risk behaviors [8]. Furthermore, other two studies available on this topic showed a higher prevalence of alcohol and cigarette use among adolescents in Lima and Callao in comparison to the national average [9,10].

Predictors of alcohol and tobacco use are multifaceted; studies conducted in the United States (USA), Thailand, Spain, Korea, and Peru among youth found alcohol and cigarette use to be associated with different socio-demographic, environmental, psychological, and behavioral factors [9-14]. The study by Harrell & Karim found significant gender differences on alcohol use frequency, and drinking to "feel high"(feel the effects of alcohol/get drunk) among USA college students [11]. A study among a national-representative sample of Thailand adolescents indicated that older age, physical fighting, and the use of other harmful substances were significantly associated with current alcohol use [12]. Parental affection was found to protect adolescents against alcohol in a study among 2,890 Spanish adolescents in 2018[13]. Jeon (2015) identified a significant relation between the independent use and co-occurrence of legal and illegal substance use and suicide ideation among Korean adolescents using 7-years span data [14]. Seinfeld & Galarza found a strong influence of the group of friends to alcohol use among Peruvian students from a representative sample in 2009[10]. Furthermore, another study using Peru national representative data found a significant association between alcohol use and two types of bullying assessed [9]. Thus, while published literature reporting on the various factors influencing adolescent use of harmful substances is available, research in developing countries including ODA recipients such as Peru is more limited. In addition, prior studies on both alcohol and cigarette use focused on assessing factors from a specific domain. For the mentioned reason, the present study tried to examine the role of different socio-environmental, psychological, violence and behavioral characteristics as correlates of alcohol and cigarette use among high school adolescents.

2. Research Purpose

Having the notion that knowing the factors related with the use of both harmful substances may lead to a better design of preventive initiatives, the specific purposes of the study are to: First, identify the socio-environmental, psychological, violence and behavioral characteristics of Lima and Callao adolescents living in the target areas of a KOICA ODA health project and the alcohol and cigarette use prevalence. Second, analyze the relationship between each substance and the socio-environmental, psychological, violence and behavioral factors considered. Third, identify the factors associated with the Lima and Callao adolescents' alcohol and cigarette use.

METHODS

1. Research Subjects

We utilized data from a cross-sectional survey conducted in November 2016 as part of a collaboration between the Yonsei Global Health Center and the Peru Office of the Korea International Cooperation Agency (KOICA) for the "Lima and Callao, Peru, Health Promotion Program 2014~2017". The participants were high school students from six schools located in the provinces of Lima and Callao. All schools were sourced from four districts, one in the Province of Lima, and three in the Province of Callao (Bellavista, Ventanilla, and Mi Peru). A three-stage cluster sampling technique was utilized. Of the total seventeen schools located in the Comas and the Callao region, six (35.3%) participated in the survey. In the first stage, three schools from three areas of Lima and one school from each district in the Callao province were selected. In the second stage, classes by high school grade (first to fifth) were selected using simple random sampling with probability proportional to the size of students. In the third stage, adolescent students were selected using the stratified random sampling technique, proportional to the gender ratio. The formula used for sample size calculation was taken from the study by Naing et al.(2006) for the prevalence studies [15]. Thus, the sample size=, where the Z=Z statistic for a level of confidence (Z=1.96), p=expected prevalence (p=.5), d=precision (d=0.05) and deff=design effect (deff=3.5), resulting in a sample size of 1,345. In this stage, we added 15% of the sample to control for non-response. The total sample size calculated was 1,547. However, after deducting those with missing information, the data from 1,477 students, 604 males and 873 females, composed the final sample for analysis.

2. Variables

1) Dependent variables

After providing the following information: "Alcohol use includes consuming pisco, rum, or beer and does not include drinking a few sips of wine in religious activities", a single-item self-report measure was used to assess alcohol use over the previous month (i.e. current alcohol use): "Over the last 30 days, on how many days did you drink more than one glass of an alcoholic drink or liquor?". The options provided ranged from "none" to "every day." Current alcohol use was defined as reporting drinking on ≥1 day. For cigarette use, a similar question and options were provided.

2) Independent variables

(1) Socio-environmental characteristics

Socio-environmental characteristics were assessed using 12 variables. Sex was dummy coded, with female equaling 0 and male equaling 1. Meanwhile, age was grouped into 11~14 years old and 15~17 years old, in order to represent early and late adolescence, as prior studies have categorized [16]. Then, perceived academic performance (PAP) was assessed by asking: "Over the last 12 months, how would you rate your academic performance: high, above average, average, below average, or poor?". For analysis, responses to this question were recoded into "high/above average," "average," and "below average/poor." We asked students "what is your family's economic status?"; response options included "upper", "above average", "average", "below average", and "low"; which were recoded into three categories (upper/above average, average and below average/low). In spite this question is not a precise method for measuring economic status, it does provide a rough indicator. Regarding parent's education level, we asked the participants about their perception and responses were categorized based on the highest level achieved (primary, high-school, or higher education). The option "don't know/don't remember" was treated as a missing value. To measure parental affection, we asked: "Over the last 30 days, how often have your parents or legal guardians shown you affection?" For this question, the options "never" and "rarely" were classified as "no" coded as 0, "sometimes" was coded as 1, and "always" and "almost always" were classified as "yes," and coded as 2. Parental monitoring was assessed based on answers to the following question: "Do your parents actually know where you at and what you do in your free time?". Parental alcohol and cigarette use was determined by adding responses about father and mother to the question "Considering all of the members of your family, which of them have drank alcohol/smoked cigarettes recently?". Finally, the questions, "Considering your closest friends, do any of them drink alcoholic beverages?", and "Considering your closest friends, do any of them smoke?" were asked to determine friends' alcohol and cigarette use, respectively.

(2) Psychological factors

The mental health status of participants was assessed using two variables: depression symptoms and stress level. The question "Over the last 12 months, have you experienced depression troubles or problems such as feeling a lack of interest, sad, dull, tired without reason, or distracted, problems sleeping, or poor appetite for two continuous weeks?" was used to evaluate students' self-consciousness of depression symptoms, while the question "Indicate, generally, what is your current level of stress?" assessed students own perception of stress level.

(3) Violence factors

We analyzed two variables related to bullying victimization: Experience of physical and verbal bullying using the following questions: "Over the last 12 months, has someone ever beaten, slapped, kicked, or otherwise physically mistreated you?" and "Over the last 30 days, how many times were you intimidated or humiliated?". In addition, physical fighting was examined using the following self-reported question: "Over the last 12 months, how many times did you participate in a physical fight?". The available responses were dichotomized to indicate either no involvement or any involvement in physical fighting.

(4) Behavioral factors

Behavioral variables included life experiences of drug use and sexual intercourse, as well as school absenteeism. The first two variables were measured similarly, using the questions: "Have you ever used drugs?" and "Have you ever had sexual intercourse?". The question: "Over the last 30 days, how many days did you skip class or school without permission?" was utilized to estimate the level of school absenteeism.

3. Data Collection

To carry out the data collection, ethical approval was acquired for the survey from the Institutional Review Board of the Wonju Campus of Yonsei University (IRB 1041849-201410-BM-048-05). On the survey day, informed consent was granted by each participating student parent before filling out the anonymous questionnaire. The sur-

vey was carried out from November 9 to 11, 2016. Students were provided with a self-administered standard questionnaire in their classrooms during normal class hours. The questionnaire was a moderately modified version of the World Health Organization (WHO)'s Global School-based Student Health Survey (GSHS), a tool for evaluating risk and protective factors in adolescents with 12 core questionnaire modules [17]. In the modified version, students recorded their exact age and drinking and smoking initiation age instead of using multiple-choice answers. Also, since the original questionnaire only included a question regarding parental cigarette use, we included one similarly worded for alcohol use. The questionnaire was translated into Spanish taking as reference the Peru's Student Health Survey carried out in 2010 by the Ministry of Health of Peru [18]. The tool was finally modified after a meeting between the Ministry of Health of Peru, WHO's Pan American Health Organization (PAHO) Peru Office experts and local health and education professionals, who reviewed the questionnaire's content validity and translation. The questionnaire consisted of 180 questions for a total of 13 categories, and this study analyzed alcohol, cigarette use and related factors based on 22 questions.

4. Statistical Analysis

Firstly, frequency distribution was used to define the characteristics of the study population and the prevalence of alcohol and cigarette use. Secondly, Pearson's chi-squared test was implemented to assess the relationship between alcohol and cigarette use and socio-environmental, psychological, violence and behavioral factors with the significance level set at 5%. Thirdly, all significant variables were subsequently entered into a multivariable logistic regression to identify factors associated with current alcohol and cigarette use separately. Adjusted odds ratios (AOR) with corresponding confidence intervals (CI) of 95% and p values are presented, with the models adjusted with school. Model fitness was assessed through the Hosmer and Lemeshow goodness of fitness test; all models were deemed fit with p values greater than 0.05. All analyses were conducted using the SPSS 25.0 Statistical Package.

RESULTS

1. Characteristics of the Respondents and Prevalence of Alcohol and Cigarette Use

Table 1 shows the distribution of the dependent and independent variables included in the present study. Most notably, a total of 24.2% and 12.1% of respondents reported having consumed more than one glass of an alcoholic beverage and having at least one puff of a cigarette during the month prior to the survey, respectively. The mean age of first drinking was 13.03 years, while the age of first smoking averaged 13.28 years. Of the sample, 59.3% were females and 40.7% were males, and the average age was 14.23 years old. Fourteen percent of the sample had below average or poor academic performance in the last year, and around 12% reported to have a below average or low economic status. Further, approximately 9% and 7% of the students reported that most or all of their close friends currently drank alcoholic drinks and smoked, respectively. Also, 38.4% reported having been involved in a physical fight one or more times within the previous 12 months.

2. Associations of Alcohol and Cigarette Use with Each Independent Variable

The x^2 test results obtained showed that most socio-environmental, psychological, violence and behavioral factors had significant relations with adolescents' alcohol use. However, gender (p=.066), both parents education level (mother p=.914; father p=.790), parental cigarette use (p=.105), and experience of verbal bullying (p=.087) were not statistically significantly associated with alcohol use; thus, these five variables were not included in the logistic regression analysis.

According to the bivariate analysis results, cigarette use differed significantly with PAP. A significantly higher proportion of students who considered their academic performance to be below the average or low (25.7%, p<.001) reported current cigarette use. The rest of the independent variables were significantly associated with cigarette use, except for father's education level (p=.148) (Table 2).

3. Adjusted Odds Ratios of Alcohol and Cigarette Use among Peruvian Adolescents

Table 3 presents the AORs of alcohol and cigarette use for the explanatory variables. Age, parental affection, parental supervision, having friends who also drink alcoholic beverages, involvement in physical fighting, and life experience of drugs use and sexual intercourse were found to be significantly associated with current alcohol use. Older adolescents (15~17 year-old) had 1.18 times greater odds of drinking alcohol (AOR 1.18; CI 1.01~1.37). Students with friends who drank alcoholic drinks were at very significant greater risk of drinking alcohol them-

Table 1. Characteristics of the Study Sample (*N*=1,477)

Variables	Categories	n (%) or M±SD
Gender	Male	604 (40.7)
	Female	873 (59.3)
Age		14.23±1.52
Perceived academic performance	High/above average	503 (34.1)
	Average	760 (51.5)
	Below average/poor	206 (13.9)
	Missing	8 (0.5)
Perceived economic status	Upper/above average	383 (25.9)
	Average	919 (62.2)
	Below average/low	175 (11.8)
Mother's education level	≤Primary	207 (14.0)
	High-school	683 (46.2)
	Higher education	433 (29.3)
	Missing	154 (10.4)
Father's education level	≤Primary	168 (11.4)
	High-school	584 (39.5)
	Higher education	457 (30.9)
	Missing	268 (18.1)
Parental affection*	No	338 (22.9)
	Sometimes	269 (18.2)
	Yes	861 (58.3)
	Missing	9 (0.6)
Parental monitoring*	No	564 (38.2)
	Sometimes	376 (25.5)
	Yes	532 (36.0)
	Missing	5 (0.3)
Parental alcohol use	No	1,062 (71.9)
	Yes	280 (19.0)
	Missing	135 (9.1)
Parental cigarette use	No	1,219 (82.5)
	Yes	113 (7.7)
	Missing	145 (9.8)
Friends' alcohol use	None	751 (50.8)
	Some friends	571 (38.7)
	Most/all friends	128 (8.7)
	Missing	27 (1.8)
Friends' cigarette use	None	745 (50.4)
	Some friends	611 (41.4)
	Most/all friends	97 (6.6)
	Missing	24 (1.6)
Depression symptoms	No	672 (45.5)
	Yes	734 (49.7)
	Missing	71 (4.8)
Stress level	None/very low/low	1,020 (69.1)
	High/very high	457 (30.9)
Physically bullied	No	943 (63.8)
	Yes	443 (30.0)
	Missing	91 (6.2)
Verbally bullied	None	1,024 (69.3)
	1 or 2 days	324 (21.9)
	3 or more days	91 (6.2)
	Missing	38 (2.6)

*In the analysis, "almost always/always" was considered to represent "yes", and "never/rarely" to represent "no."

Table 1. Characteristics of the Study Sample (Continued) (*N*=1,477)

Variables	Categories	n (%) or M±SD
Physical fighting	None	910 (61.6)
	One or more times	567 (38.4)
Currently drinking	No	1,119 (75.8)
	Yes	358 (24.2)
	Missing	37 (2.4)
Age of first drinking		13.03±2.45
Currently smoking	No	1,298 (87.9)
	Yes	179 (12.1)
	Missing	21 (1.4)
Age of first smoking		13.32±2.07
Experience using drugs	No	1,336 (90.5)
	Yes	106 (7.2)
	Missing	35 (2.4)
Age of first drug use		13.22±2.96
Experience of sexual intercourse	No	1,147 (77.7)
	Yes	278 (18.8)
	Missing	52 (3.5)
Age of first sexual relation		13.73±2.31
School absenteeism	None	1,068 (72.3)
	One or more days	404 (27.4)
	Missing	5 (0.3)

selves (some friends AOR 4.79; CI 2.77~8.28; most/all friends AOR 18.77; CI 7.28~48.38). Regarding risk behaviors, participants who were involved in physical fights were 1.93 times more likely to report consuming alcohol compared with those who did not involve in any such quarreling (AOR 1.93; CI 1.25~2.96). Furthermore, alcohol use significantly differed between adolescents who had experience of using drugs and had sexual intercourse in their life (AOR 3.70; CI 1.66~8.26; AOR 1.71; CI 1.02~2.86).

The participants' current cigarette use was significantly affected by their perceived academic performance, parental affection, friends' smoking behavior as well as life experience of drug use and sexual intercourse. Students with a below average or poor perceived academic performance were over 6 times more likely to smoke cigarettes as compared to high performers. Students with friends who currently smoked cigarettes were at a significant increased risk of engaging in the same behavior as compared to students with nonsmoker friends (some friends AOR 12.96; CI 3.40~49.37; most/all friends AOR 21.05; CI 4.98~88.92). Furthermore, adolescents who had used drugs and had sexual intercourse in their life had 8.54 and 2.19 times greater odds of smoking cigarettes, respectively.

Finally, adolescent students whose parents showed them affection, and were aware of their whereabouts and spare

Table 2. Relation of Independent Variables with Adolescents' Alcohol and Cigarette Use

Factors	Variables	Categories	Alcohol use			Cigarette use		
			No	Yes	x^2 (p)	No	Yes	x^2 (p)
			n (%)	n (%)		n (%)	n (%)	
Socio-environmental factors	Gender	Male	437 (73.3)	159 (26.7)	3.38	508 (85.2)	88 (14.8)	6.73
		Female	672 (77.5)	195 (22.5)	(.066)	778 (89.7)	89 (10.3)	(.010)
	Age (in years)	11~14 years	675 (83.5)	133 (16.5)	55.10	741 (91.7)	67 (8.3)	23.81
		15~17 years	419 (66.7)	209 (33.3)	(<.001)	523 (83.3)	105 (16.7)	(<.001)
	PAP	High/above average	418 (83.1)	85 (16.9)	36.09	468 (93.0)	35 (7.0)	48.46
		Average	568 (74.7)	192 (25.3)	(<.001)	670 (88.2)	90 (11.8)	(<.001)
		Below average/poor	128 (62.1)	78 (37.9)		153 (74.3)	53 (25.7)	
	Perceived economic status	Upper/above average	311 (81.2)	72 (18.8)	8.35	346 (90.3)	37 (9.7)	6.33
		Average	678 (73.8)	241 (26.2)	(.015)	807 (87.8)	112 (12.2)	(.042)
		Below average/low	130 (74.3)	45 (25.7)		145 (82.9)	30 (17.1)	
	Mother's education level	≤Primary	156 (75.4)	51 (24.6)	0.18	183 (88.4)	24 (11.6)	8.09
		High-school	520 (76.1)	163 (23.9)	(.914)	586 (85.8)	97 (14.2)	(.017)
		Higher education	325 (75.1)	108 (24.9)		396 (91.5)	37 (8.5)	
	Father's education level	≤Primary	129 (76.8)	39 (23.2)	0.47	151 (89.9)	17 (10.1)	3.82
		High-school	450 (77.1)	134 (22.9)	(.790)	505 (86.5)	79 (13.5)	(.148)
		Higher education	344 (75.3)	113 (24.7)		412 (90.2)	45 (9.8)	
	Parental affection	No	216 (63.9)	122 (36.1)	43.12	266 (78.7)	72 (21.3)	42.17
		Sometimes	195 (72.5)	74 (27.5)	(<.001)	231 (85.9)	38 (14.1)	(<.001)
		Yes	702 (81.5)	159 (18.5)		793 (92.1)	68 (7.9)	
	Parental monitoring	No	380 (67.4)	184 (32.6)	34.47	467 (82.8)	97 (17.2)	23.84
		Sometimes	301 (80.1)	75 (19.9)	(<.001)	335 (89.1)	41 (10.9)	(<.001)
		Yes	433 (81.4)	99 (18.6)		491 (92.3)	41 (7.7)	
	Parental alcohol use	No	842 (79.3)	220 (20.7)	21.54	953 (89.7)	109 (10.3)	10.15
		Yes	185 (66.1)	95 (33.9)	(<.001)	232 (82.9)	48 (17.1)	(.001)
	Parental cigarette use	No	935 (76.7)	284 (23.3)	2.62	1,081 (88.7)	138 (11.3)	4.02
		Yes	79 (69.9)	34 (30.1)	(.105)	96 (82.8)	20 (17.2)	(.045)
	School	1	159 (84.1)	30 (15.9)	26.98	172 (91.0)	17 (9.0)	25.31
		2	245 (82.2)	53 (17.8)	(<.001)	281 (94.3)	17 (5.7)	(<.001)
		3	174 (76.3)	54 (23.7)		203 (89.0)	25 (11.0)	
		4	215 (74.4)	74 (25.6)		250 (86.5)	39 (13.5)	
		5	198 (70.2)	84 (29.8)		235 (83.3)	47 (16.7)	
		6	128 (67.0)	63 (33.0)		157 (82.2)	34 (17.8)	
Socio-environmental factors	Friends' alcohol use	None	696 (92.7)	55 (7.3)	306.62	724 (96.4)	27 (3.6)	201.95
		Some friends	362 (63.4)	209 (36.6)	(<.001)	480 (84.1)	91 (15.9)	(<.001)
		Most/all friends	39 (30.5)	89 (69.5)		68 (53.1)	60 (46.9)	
	Friends' cigarette use	None	668 (89.7)	77 (10.3)	198.53	733 (98.4)	12 (1.6)	226.40
		Some friends	394 (64.5)	217 (35.5)	(<.001)	492 (80.5)	119 (19.5)	(<.001)
		Most/all friends	36 (37.1)	61 (62.9)		50 (51.5)	47 (48.5)	
Psychological factors	Depression symptoms	No	563 (83.8)	109 (16.2)	45.93	620 (92.3)	52 (7.7)	25.53
		Yes	501 (68.3)	233 (31.7)	(<.001)	612 (83.4)	122 (16.6)	(<.001)
	Stress level	None/very low/low	800 (78.4)	220 (21.6)	12.80	922 (90.4)	98 (9.6)	19.52
		High/very high	319 (69.8)	138 (30.2)	(<.001)	376 (82.3)	81 (17.7)	(<.001)
Violence factors	Physically bullied	No	741 (78.6)	202 (21.4)	17.53	859 (91.1)	84 (8.9)	30.91
		Yes	302 (68.2)	141 (31.8)	(<.001)	357 (80.6)	86 (19.4)	(<.001)
	Verbally bullied	None	794 (77.5)	230 (22.5)	4.89	921 (89.9)	103 (10.1)	13.85
		1 or 2 days	233 (71.9)	91 (28.1)	(.087)	268 (82.7)	56 (17.3)	(.001)
		3 or more days	66 (72.5)	25 (27.5)		76 (83.5)	15 (16.5)	
	Physical fighting	None	746 (82.0)	164 (18.0)	49.88	844 (92.7)	66 (7.3)	52.71
		One or more times	373 (65.8)	194 (34.2)	(<.001)	454 (80.1)	113 (19.9)	(<.001)
Behavioral factors	Currently drinking	No	-			1,076 (96.2)	43 (3.8)	296.93
		Yes				222 (62.0)	136 (38.0)	(<.001)
	Experience using drugs	No	1,063 (79.6)	273 (20.4)	140.69	1,224 (91.6)	112 (8.4)	240.03
		Yes	30 (28.3)	76 (71.7)	(<.001)	43 (40.6)	63 (59.4)	(<.001)
	Experience of sexual intercourse	No	945 (82.4)	202 (17.6)	142.25	1,068 (93.1)	79 (6.9)	148.79
		Yes	134 (48.2)	144 (51.8)	(<.001)	185 (66.5)	93 (33.5)	(<.001)
	School absenteeism	None	855 (80.1)	213 (19.9)	40.50	975 (91.3)	93 (8.7)	43.42
		One or more days	259 (64.1)	145 (35.9)	(<.001)	318 (78.7)	86 (21.3)	(<.001)

PAP=Perceived academic performance.

Table 3. Adjusted Odds Ratios of Alcohol and Cigarette Use for Explanatory Variables

Factors	Variables	Categories	Alcohol use*		Cigarette use†	
			AOR (95% CI)	*p*	AOR (95% CI)	*p*
Socio-environmental factors	Gender	Female	-		1	.273
		Male			1.96 (0.84~4.57)	
	Age group	11~14 years	1	.029	1	.095
		15~17 years old	1.18 (1.01~1.37)		0.79 (0.60~1.04)	
	PAP	High/above average	1	.749	1	.057
		Average	0.92 (0.56 1.51)	.710	2.61 (0.97~7.05)	.001
		Below average/poor	1.13 (0.59~2.15)		6.78 (2.11~21.79)	
	Perceived economic status	Upper/above average	1	.694	1	.720
		Average	1.16 (0.54~2.49)	.227	0.81 (0.25~2.62)	.865
		Below average/low	1.41 (0.80~2.49)		1.09 (0.39~3.02)	
	Mother's education level	≤ Primary	-		1	.837
		High-school			0.90 (0.34~2.37)	.437
		Higher education			0.64 (0.21~1.97)	
	Parental affection	No	1	.619	1	.747
		Sometimes	0.86 (0.47~1.57)	.039	0.85 (0.32~2.29)	.046
		Yes	0.60 (0.35~0.89)		0.58 (0.25~0.96)	
	Parental monitoring	No	1	.190	1	.123
		Sometimes	0.69 (0.41~1.19)	.005	0.62 (0.34~1.13)	.007
		Yes	0.45 (0.25~0.78)		0.51 (0.31~0.82)	
	Parental alcohol use	No	1	.804	1	.609
		Yes	1.06 (0.66~1.69)		1.21 (0.58~2.51)	
	Parental cigarette use	No	-		1	.786
		Yes			1.15 (0.40~3.28)	
	School	School 1	1	.012	1	.637
		School 2	2.62 (1.23~5.56)	.012	1.35 (0.39~4.71)	.896
		School 3	2.63 (1.23~5.61)	.039	1.08 (0.34~3.46)	.914
		School 4	2.20 (1.04~4.67)	.011	0.93 (0.26~3.31)	.614
		School 5	2.61 (1.25~5.48)	.032	1.33 (0.44~3.99)	.109
		School 6	2.53 (1.09~5.90)		2.83 (0.79~10.05)	
	Friends' alcohol use	None	1	< .001	1	.280
		Some friends	4.79 (2.77~8.28)	< .001	1.77 (0.62~5.01)	.030
		Most/all friends	18.77 (7.28~48.38)		4.71 (1.15~19.20)	
	Friends' cigarette use	None	1	.987	1	< .001
		Some friends	1.00 (0.59~1.69)	.073	12.96 (3.40~49.37)	< .001
		Most/all friends	0.39 (0.14~1.09)		21.05 (4.98~88.92)	
Psychological factors	Depression symptoms	No	1	.120	1	.530
		Yes	1.44 (0.90~2.30)		1.30 (0.56~3.03)	
	Stress level	None/very low/low	1	.845	1	.172
		High/very high	0.95 (0.60~1.51)		1.70 (0.46~2.26)	
Violence factors	Physically bullied	No	1	.437	1	.962
		Yes	0.83 (0.52~1.31)		1.02 (0.64~3.33)	
	Verbally bullied	None	-		1	.360
		1 or 2 days			1.46 (0.65~3.33)	.735
		3 or more days			1.05 (0.43~2.59)	
	Physical fighting	None	1	.003	1	.436
		One or more times	1.93 (1.25~2.96)		1.47 (0.45~3.84)	
Behavioral factors	Currently drinking	No	-		1	< .001
		Yes			7.49 (3.66~15.33)	
	Currently smoking	No	1	< .001	-	
		Yes	5.05 (2.68~9.51)			
	Experience using drugs	No	1	.001	1	< .001
		Yes	3.70 (1.66~8.26)		8.54 (3.23~22.56)	
	Experience of sexual intercourse	No	1	.040	1	.039
		Yes	1.71 (1.02~2.86)		2.19 (1.04~4.63)	
	School absenteeism	None	1	.318	1	.293
		One or more days	1.26 (0.79~2.00)		1.47 (0.71~3.05)	

*Adjusted for age group, PAP, perceived economic status, parental affection, parental monitoring, parental alcohol use, school, friends' alcohol and cigarette use, depression symptoms, stress level, experience of physical bullying, physical fighting, currenly smoking, life experience of drug use, experience of sexual intercourse, and school absenteeism; †Adjusted for gender, age group, PAP, perceived economic status, mother's education level, parental affection, parental monitoring, parental alcohol and cigarette use, school, friends' alcohol and cigarette use, depression symptoms, stress level, experience of physical and verbal bullying, physical fighting, current alcohol use, life experience of drug use, experience of sexual intercourse, and school absenteeism.

time activities were significantly less likely to report consuming both substances. For alcohol, the AOR of parental affection was 0.60 with a CI of 0.35~0.89, and for parental monitoring the AOR was 0.45 with a CI of 0.25~0.78. In the case of cigarettes, the results are as follow: parental affection AOR 0.58; CI 0.25~0.96, and parental monitoring AOR 0.51; CI 0.31~0.82.

DISCUSSION

Our study revealed that the current prevalence of alcohol and cigarette use among high school adolescents in Lima and Callao, Peru was 24.2% and 12.1%, respectively. In addition, we also identified that the average age of initiation for both substances was at 13 years old. For alcohol use, the prevalence found was greater than for middle and high school level students in Korea in the same year (15.0%) [19], and similar to a study among 13-to 17-year old adolescents in Brazil in 2015 (23.8%) [20]. Yet, the prevalence found was lower than the average found in a study across 35 European countries in 2015 (48.0%) which included 15-to 16-year old adolescents [21].

In relation to the factors affecting alcohol use among adolescents, socio-cultural aspects can be considered. We mean that the frequency and amount of adolescent alcohol use are influenced by different drinking cultures (i.e. social drinking norms) [22]. In the Latin American region, alcohol use is socially accepted, and its use by adolescents represent a combination of situations, people, and feelings that enable new social relationships, and the start of the adult life. A report by PAHO on regional trends in 2015 showed that many countries in the region had higher risky alcohol use patterns among youth (15-to 19-year old heavy episodic drinking) than among the total population. The report also highlighted how economic development and the new values imported from the globalization process made excessive and abrupt alcohol consumption a trend in the region, specially among youth [23]. Furthermore, differences in alcohol marketing restrictions between countries might also take part.

In regard to cigarette use, the prevalence found in our study is greater than the one reported for Brazil (5.6%) [21], and similar to a study among the USA (12.7%) [24]. These results may have to do with the sustained efforts Brazil has engaged into in accordance with commitments under the Framework Convention on Tobacco Control (FCTC), a convention that has not been fully implemented in both, Peru and the USA, especially in regards to bans on advertising and tax/price measures [25].

The analysis results showed no significant difference of alcohol use between males and females, which differs from a study among adolescents from five cities around the world (Baltimore, USA; Delhi, India; Johannesburg, South Africa; Ibadan, Nigeria, and Shanghai, China) [26]. However, this is a phenomenon identified by other studies, pointing out a socio-cultural change in traditional gender roles, attitudes and alcohol marketing practices targeting women in Latin America [23], phenomenon that may not have occurred in the five cities mentioned above.

In relation to age, this study identified significant alcohol (33.3% versus 16.5%) and cigarette use differences (16.7% versus 8.3%) between late and early adolescence, a trend identified in the last national study in Peru in 2012[5]. Also, 15~17 year old adolescents had 1.18 greater odds of current alcohol use, similar to the findings in the study including adolescents from Baltimore [26]. This may be related to the increasing independence that characterizes the adolescent transition to the adult stage and its lifestyle, as well as the influence of social norms [22,23], such as starting age and amounts considered socially acceptable. This could make younger adolescents view alcohol and its effects negatively, while perceptions be more positive for older adolescents. Thus, older adolescents could be more likely to consume alcohol than their younger counterparts.

Family factors have been found to have an effect on adolescents' substance use. In this regard, our study found that parental affection was associated with a reduced likelihood of both alcohol and cigarettes use, a result similar to a study among Spanish adolescents in 2018[13]. Nonetheless, the effect of parental drinking and smoking on both substances was the weakest when variables related to friends use were included simultaneously in the model. In this sense, our study identified friends drinking and smoking had the strongest impact on adolescent alcohol and cigarette use, which is consistent with other previous studies [27]. This result suggests that though substance use might be strongly influenced by the friends group, positive parenting practices such as showing affection and monitoring child's activities may have an indirect influence (e.g. on peer selection or the level of exposure to peer use). However, further research is needed to determine how much of this and other positive parenting practices would be required to counterbalance the strong peer influence.

The violence factor that significantly affected the use of alcohol in Lima and Callao adolescents was physical fighting. Students who were involved in one or more physical fights were 1.93 times more likely to report current alcohol use. Though it is difficult to clarify the causal relation between both variables, research has suggested that alco-

hol use both, affects to and might be caused by adolescents involvement in other risk behaviors including violence [28]. In addition, the early average age of initiation in drugs (13.22 years), sexual intercourse (13.73 years), and the significant associations found between current alcohol and cigarette use and these variables, also indicate multiple risk behaviors occur during adolescence [12,29].

Current cigarette use was influenced by PAP in our study, which is consistent with a study that reported bidirectional associations between the use of this harmful substance and academic achievement [30]. This would indicate that students who fail to achieve good grades may seek to deal with such results by involving in smoking, which at the same time may exacerbate their lack of engagement in schoolwork, thus affecting their overall performance.

This study has some limitations to be considered. Firstly, as this is a cross-sectional study, no causal inferences can be drawn from our results, only associations. Secondly, there is a risk for reporting bias since all measurement of variables were based on self-reported questions. Thirdly, there might be correlates that we did not address through the present study, such as those related with consumption motives and other psychological factors like suicide ideation. Also, this study can not be generalized, as it was carried out in four districts representing two of the total twenty five provinces of Peru.

This research has shown that the factors affecting the current alcohol and cigarette use of Lima and Callao adolescents include socio-environmental, violent and behavioral characteristics. These comprise parental affection and monitoring, friends' alcohol and cigarette use, academic performance, physical fighting and the co-occurrence of other risk behaviors. Thus, the results of the study imply adolescents' use of these substances occur in situations in which individuals, families, and schools influence each other. In addition, the results emphasize that prevention initiatives should be focused on the multiple risk behaviors that occur during adolescence. Actions should promote positive parenting practices, family togetherness, and a supportive school climate. For the latter, school staff should be encouraged to use supportive practices (e.g. positive feedback, praise, etc), and specific strategies should be in place for detecting and handling risk situations including harmful substance use and fights. In addition, establishing programs directed by peer leaders that include activities such as group sports, integration games or club meetings would provide an opportunity to both, promote behavioral change in students, and to strengthen social relations without the presence of alcohol, cigarettes and other harmful substances.

CONCLUSION

Alcohol and cigarette use among adolescents are prominent public health problems worldwide. This study identified the prevalence of current alcohol and cigarette use among high school adolescents in Lima and Callao to be 24.2% and 12.1% each. In addition, it showed that older age, parental affection, parental monitoring, friends' alcohol use, physical fighting and involvement in other risk behaviors of smoking, drug use, and sexual intercourse were significantly associated with current alcohol use. Further, perceived academic performance, parental affection, parental monitoring, friends' cigarette use and involvement in other risk behaviors (drinking, drug use, sexual intercourse) were found to be associated with current cigarette use.

Initiatives for alcohol and cigarette use prevention including ODA-funded programs should promote positive parenting practices, family togetherness, and a supportive school climate. In addition, establish peer-led programs that promote behavior change in students and strengthen social relations without the presence of alcohol, cigarettes and other harmful substances.

CONFLICTS OF INTEREST

The authors declared no conflict of interest.

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