



Perceived Risk and Social Norms Associated with Alcohol, Tobacco, and Marijuana Use in Argentinean Teenagers

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Abstract

This study examined the association of social norms (i.e., descriptive and injunctive norms) and perceived risk with alcohol, tobacco, and marijuana use in a sample of 378 Argentinean adolescents (60.3% girls, mean age 15.26 [SD = 1.26]). We conducted descriptive, correlation, and multivariate (i.e., hierarchical regression) analyses to describe substance use and examine the association of social norms and perceived risk with the frequency of heavy episodic drinking, tobacco, and marijuana. Perceived risk, injunctive norms, and descriptive peer norms were associated with frequency of substance use. Parental, but not peer, injunctive norms were associated with heavy alcohol use while peer injunctive norms were associated with tobacco and marijuana use. Findings suggest that increasing parent's disapproval of substance use, reducing biases on descriptive and injunctive social norms on substance use, or increasing the perceived risk associated with such use may be valuable potential targets in interventions to reduce/prevent underage substance use.

Keywords Adolescents · Alcohol · Tobacco · Marijuana · Social norms · Perceived risk

Approximately half, one-third, and 7.8% of Argentinean teenagers aged 13–18 reported alcohol, tobacco, and marijuana use, respectively, in the previous month (Secretariat of Integrated Policies on Drugs of the Argentine Nation [SEDRONAR] 2017). Moreover, between 35 and 50% exhibited a heavy episodic drinking (HED) pattern (Pilatti et al., 2013; Rivarola Montejano et al., 2016; SEDRONAR, 2017), which is associated with greater occurrence of several negative consequences (Kuntsche et al., 2017; Pilatti et al., 2016).

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Social cognitive models posit that behavior is partially determined through cognitions learned and maintained via exposure to social models. For example, adolescents tend to overestimate how much their peers use substances (i.e., descriptive norms) and the level of approval of substance use behaviors (i.e., injunctive norms). Both biases are used to justify their own substance use (Neighbors et al., 2006). The perceived risk is also associated to substance use (Johnston et al., 2020; Lipari, 2013). College students who use marijuana perceive lower risk using the substance than counterparts that do not use marijuana (Kilmer et al., 2007; Lopez-Quintero et al., 2011). Yet, the evidence is equivocal with some studies (e.g., Trujillo et al., 2007) failing to show a significant association between risk perception and substance use.

Despite these controversies, perceived risk and social norms are widely considered important to explain HED, tobacco, and marijuana use among adolescents in industrialized countries (Pedersen et al., 2017; Vallentin-Holbech et al., 2017) and thus may help shed light on these behaviors in Argentina. Descriptive and injunctive norms have been associated with high levels of alcohol, tobacco, and marijuana use in Argentinean college freshman (Pilatti et al., 2017); however, these effects are also important to be examined in younger samples. The age range between 13 and 17 is where most people initiate alcohol, tobacco, and marijuana use, often proceeding to excessive use (Kuntsche & Gmel, 2013) and establishing unhealthy substance use habits. As substance-related negative consequences and rates of dependence markedly increased among those with substance onset during adolescence (Jordan & Andersen, 2017), it is important to increase our understanding of the risk factors associated with underage substance use. Previous work also suggested the association between risk factors and alcohol use during adolescence may be sex specific. For instance, while alcohol-related gender role stereotypes (e.g., such as that heavy alcohol use is more socially accepted for boys than for girls) seem to put boys at greater risk for heavy alcohol use, girls seem to be more sensitive to social norms, including peer pressure and vicarious exposure to drinking peers (Dir et al., 2017).

HED, tobacco use, and marijuana use among high school students in Argentina are heavily understudied behaviors. This is unfortunate, considering the prevalence of substance use among Argentinean adolescents (SEDRONAR, 2017). Knowing more about the association between substance use and these variables that hold promise as intervention targets to delay or reduce underage substance is an important first step towards the design/implementation of prevention efforts. Alcohol has a prominent role in the Argentinean culture, in social events and in everyday life. Moreover, the Argentinean-drinking style has shifted from a “Mediterranean” style (i.e., frequent consumption of lower quantities) to more frequent episodes of HED (Cremonte et al., 2010). In Argentina, reflecting the lack of social acceptance of tobacco use, regulations for tobacco use and advertisement are stricter than those for alcohol (Law 26.687/2011). It is prohibited the advertising, promotion, and sponsorship of tobacco products in all media and on public roads. The attitude of Argentinians towards the use of marijuana has been rapidly changing, probably due to recent changes in the laws regulating its use. The first national law on the use of cannabis for medical and research purposes (Law 27,350) was approved in 2017.

Considering that cultures and societies shape substance use behaviors (Dietze et al., 2013), these local idiosyncrasies raise the question whether the associations found in past research will remain similar in the Argentinean context. Moreover, prior research identified cultural differences in parenting practices (Bornstein, 2013) which seem to be influenced by socioeconomic conditions, increasing the prevalence of a more punitive parenting style at low socioeconomic levels (Roubinov & Boyce, 2017). This is, of course, a possibility. However, it is also likely that the associations found in previous studies will replicate in

the present sample. Supporting this hypothesis, previous work with college students (Bravo et al., 2018) found that the associations between distal antecedents — including drinking norms — and alcohol outcomes were invariant across countries (including the US, Spain and Argentina). Additionally, previous work with college students from Argentina (Pilatti et al., 2017) replicated associations between perceived risk, social norms — both descriptive and injunctive — and substance use previously found with US college students (LaBrie et al., 2010; Neighbors et al., 2011a, 2011b, 2011c). Nevertheless, it is important to examine these associations because, if they play out similarly, prevention efforts developed in other cultures (e.g., personalized normative feedback, brief interventions, parent-based interventions [for an overview see Kuntsche & Kuntsche, 2016]) could be relatively easily transferred to and applied in Argentina. However, due to a lack of previous studies in the target age group (i.e., high-school adolescents), we cannot know for sure. It is, therefore, important to address this void in research. Therefore, the present study aimed to examine, in a sample of Argentinean adolescents (high school students), the association of perceived risk and social norms with substance use (i.e., HED, tobacco, and marijuana use). Additionally, the study aimed to describe substance use in this sample.

Method

Sample

The headmasters of 28 high schools in the city of Córdoba (Argentina) were invited to participate in the study. Nine schools (32.14% [5 public, 4 privates]) accepted being part of the study. The majority of those not interested did not provide further explanation for the negative response. Schools were selected based on an accidental sampling procedure (i.e., opportunity sampling procedure). However, an effort was made to achieve a balanced distribution according to sex and type of school (private [with tuition] or public [tuition free]). After obtaining authorization from the school, the parents of the students were informed about the study and requested to provide signed informed consent. Adolescents whose parents or guardians gave their consent were requested to provide verbal consent. Although 394 adolescents (aged 13–18 years) completed the survey, six (1.5%) were excluded from the sample due to inconsistent responses. Only 10 participants were aged 18, and they were excluded because they may represent a different subpopulation of high school students. In Argentina, the legal age to buy alcohol is 18 years old, and by deleting these 10 cases, all participants in our study are below the legal drinking age in Argentina. The final sample comprised 378 adolescents (see Table 1 for sociodemographic characteristics).

Procedure

Four psychology students administered, in about 35 min, a paper-and-pencil survey in the classroom. Before data collection, they explained the general aim of the study was to obtain data on substance use and emphasized the confidentiality of the data and that participation was voluntary and anonymous. No personally identifying information was collected, and participants were not compensated (i.e., monetary or otherwise). Participants provided their consent to participate in the study. The study was conducted in accordance with the declaration of Helsinki, and it followed the ethical guidelines of the American

Table 1 Description of socio-demographic variables

Socio-demographic variables	
Gender ¹	
Girls	60.3% (<i>n</i> = 228)
Boys	38.9% (<i>n</i> = 147)
Type of school	
Private	61.6% (<i>n</i> = 233)
Public	38.4% (<i>n</i> = 145)
Grades ²	
Second	9.8% (<i>n</i> = 37)
Third	23.5% (<i>n</i> = 89)
Fourth	19.6% (<i>n</i> = 74)
Fifth	27.5% (<i>n</i> = 104)
Sixth	19.6% (<i>n</i> = 74)
Age	
13	9% (<i>n</i> = 34)
14	23.3% (<i>n</i> = 88)
15	20.1% (<i>n</i> = 76)
16	28% (<i>n</i> = 106)
17	19.6% (<i>n</i> = 74)
Mean age (\pm SD)	
Total sample	15.26 \pm 1.26

¹Gender: three participants did not include their gender

²Grades: grades 2 to 6 correspond to grades 8 to 12 in the educational system of the USA

Psychological Association (2016) and the Argentinean National Law for the Protection of Personal Data.

Measures

Substance Use

Alcohol use was defined as drinking ≥ 1 standard drink unit ([SDU], defined as containing 14 g pure ethanol; Argentinean National Health Department, 2012) of any alcoholic beverage per drinking session. An image described the milliliters of different alcoholic beverages that corresponded to 1 SDU. Following recommendations for underage drinkers (NIAAA, 2016), we defined HED as the consumption of $\geq 42/56$ g of pure alcohol (girls/boys) per drinking session. Adolescents reported lifetime, last year, last month, and last week use (0 = no, 1 = yes) of alcohol, tobacco, or marijuana. We also asked about last month frequency (i.e., number of days [continuous variable]) of alcohol use, HED, tobacco use, or marijuana use. Last-year frequency of alcohol use, HED, tobacco use, or marijuana use were measured with an ordinal variable (from 0 = none [alcohol use, HED, tobacco, or marijuana use] within the previous year to 11 = ≥ 3 times per week). For alcohol, we also measured the usual (i.e., mode) quantity (i.e., how many SDUs did you usually consume on each drinking occasion?) of alcohol consumption within the previous month. Participants also reported lifetime and last-month occurrence (0 = no; 1 = yes) of HED and drunkenness

episodes (i.e., drinking alcohol to the point of getting drunk; Wechsler et al., 2000). For tobacco, participants reported the usual (i.e., mode) quantity (i.e., how many tobacco cigarettes did you smoke per smoking day?) of tobacco use within the previous month.

Social Norms

Injunctive Norms

Five questions measured perceived peer approval of (a) daily drinking 1–2 or (b) 3–4 SDU, (c) drinking 3–4 SDU every weekend, (d) drinking until getting drunk, and (e) drinking and driving. The response scale ranged from 1 (strong disapproval) to 5 (strong approval). A similar set of five questions asked about perceived parental approval of alcohol use. Following previous work (Neighbors et al., 2008; Pilatti et al., 2017), answers to each set of questions (perceived parental norms and perceived peers' norms) were added up (Cronbach's $\alpha_{\text{peers}}=0.80$; $\alpha_{\text{parental}}=0.78$). Two sets of three questions each assessed perceived peer and parental approval of (a) daily smoking, (b) smoking on weekends or sometimes per month, and (c) smoking ≥ 10 cigarettes in 1 day (1=strong disapproval; 5=strong approval). The responses were added up ($\alpha_{\text{peers}}=0.85$, $\alpha_{\text{parental}}=0.85$). We used four questions to measure perceived peer and parental approval (from 1=strong disapproval to 5=strong approval) of different frequencies of marijuana use: (a) once or twice, (b) ≤ 1 per month, (c) 1–3 times per month, (d) ≥ 1 per week. Answers to each set of questions were also added to a summary score ($\alpha_{\text{peers}}=0.91$, $\alpha_{\text{parental}}=0.94$).

Descriptive Norms for Substance Use

Participants reported the frequency of alcohol, tobacco, and marijuana use (from 0=did not consume [alcohol, tobacco or marijuana] within the previous year to 12= ≥ 4 times per week) they perceived among their closest female and male friends. Responses to these two questions were combined to generate a measure of perceived frequency of alcohol, tobacco, and marijuana use among peers.

Perceived Risk Associated with Substance Use

Following Pilatti et al. (2017), participants indicated what risk they perceive (i.e., “How much do you think adolescents risk harming themselves [physically, in their health, or in other ways]”) by (a) drinking 1–2 SDUs almost every day, (b) daily heavy episodic (3–4 SDUs) drinking, (c) drinking 3–4 SDUs every weekend, (d) drinking until getting drunk, (e) combining alcohol and marijuana, and (f) combining alcohol with energy drinks. Three items asked about the perceived risk of (a) daily smoking, (b) smoking on weekends or sometimes per month, and (c) smoking ≥ 10 cigarettes in 1 day. Four items measured the perceived risk of using marijuana (a) once or twice, (b) occasionally (less than once per month), (c) regularly (1–3 times per month), or (d) frequently (≥ 1 per week). Response options ranged from 1=no risk to 5=high risk. Following Pilatti et al. (2017), answers were summed up for each substance, yielding a variable that represented the perceived risk associated with alcohol ($\alpha=0.78$), tobacco ($\alpha=0.74$), and marijuana use ($\alpha=0.87$).

Data Analysis

The analyses were conducted in the statistical software SPSS 23.0. Missing data varied between 0.3 and 4.9% and were excluded case-wise. Among those who reported alcohol use in the last month, we calculated (1) the average number of drinking days (including days with HED) and (2) the average number of (a) SDUs per drinking occasion and (b) SDUs within the heaviest drinking occasion. Among those who reported tobacco use in the last month, we calculated the average number of (a) days with tobacco use and (b) cigarettes per smoking day. These analyses were conducted for the total sample and separately for girls and boys and for the age groups. Sex differences in substance use were determined using the χ^2 test or Student's *t*-test for nominal and continuous dependent variables, respectively.

To examine the association between substance use behaviors and social norms and perceived risk, we conducted bivariate Pearson correlations separately for girls and boys. The drinking outcomes were last-month and last-year frequency of (a) usual alcohol use and (b) HED. The tobacco and marijuana outcomes were last-month and last-year frequency of tobacco and marijuana use. We then conducted, separately for girls and boys, multiple regression analyses to examine the association of social norms and perceived risk on last-year frequency of (1) HED, (2) tobacco use, and (3) marijuana use as dependent variables. Within each regression model, we included chronological age first, and then, in the second step, perceived parental approval and perceived risk were introduced. Peers' variables (i.e., perceived approval and descriptive norms) were entered in the final step.

Results

Descriptive Results and Sex-Related Differences

Alcohol Use

Seventy-five percent of the participants reported lifetime and last-year alcohol use, and 57% engaged in alcohol use within the previous month (Table 2). Last-month drinkers reported to drink close to 5 SDUs per drinking occasion or 7 during the heaviest drinking session. Almost 50% of the sample reported HED during the last month, while 64% engaged in HED in their lifetime. Slightly more than one-fifth reported being drunk within the previous month. Overall, girls and boys exhibited statistically similar drinking behaviors, except for usual or heaviest quantity (i.e., number of SDUs) that was significantly higher in boys than in girls.

Tobacco Use

Lifetime use of tobacco was almost 40%, while 30% reported smoking tobacco within the previous year (Table 3). Around one-fifth reported smoking tobacco in the last month. These participants reported to smoke an average of 4.81 cigarettes per smoking day, with

Table 2 Occurrence of alcohol use: for the total sample and separate by gender and age categories

	Total ¹ <i>n</i> = 378	Girls <i>n</i> = 228	Boys <i>n</i> = 147	χ^2/it	13 <i>n</i> = 34	14 <i>n</i> = 88	15 <i>n</i> = 76	16 <i>n</i> = 106	17 <i>n</i> = 74
Alcohol use									
Lifetime	78.9%	79.9%	77.7%	0.25	60.6%	56.1%	82.4%	93.1%	90.1%
12 M	76.1%	76.8%	75.5%	0.08	61.8%	56.8%	77.3%	86.8%	89.2%
30D	57%	59.6%	53.1%	1.58	29.4%	37.5%	60%	64.2%	79.7%
7D	32.4%	32.5%	32.7%	0.002	14.7%	13.6%	33.3%	36.8%	55.4%
F-30D	3.48 ± 3.06	3.27 ± 3.09	3.90 ± 3.00	1.38	3.29 ± 3.15	2.72 ± 3.62	2.95 ± 2.40	4.37 ± 3.49	3.30 ± 2.42
Q-DO	4.90 ± 3.93	4.50 ± 3.64	5.66 ± 4.33	2.02*	2.69 ± 1.53	3.85 ± 2.80	4.43 ± 3.37	5.81 ± 4.75	5.22 ± 3.92
Max Q	6.95 ± 5.63	6.32 ± 5.36	8.03 ± 5.92	2.11*	3.50 ± 1.89	5.48 ± 4.48	6.00 ± 4.84	8.31 ± 6.93	7.37 ± 5.08
Drunkenness									
Lifetime	41.8%	43.9%	38.8%	0.95	14.7%	19.3%	38.2%	50.9%	71.6%
30D	22%	21.5%	22.4%	0.05	11.8%	10.2%	14.5%	24.5%	44.6%
HED									
Lifetime	64%	63.5%	64.8%	0.07	48.5%	44.2	63.9%	76%	77%
30D	46.8%	49.1%	43.5%	1.12	23.5%	27.3	43.4%	56.6%	70.3%
F-30D	2.25 ± 2.12	2.05 ± 2.00	2.64 ± 2.30	1.90	1.13 ± 1.13	1.66 ± 1.80	1.72 ± 1.75	2.90 ± 2.44	2.38 ± 2.07

For last-month (30D) frequencies and quantity of alcohol use (Q), data are presented as means ± standard deviations. Means and standard deviations were calculated among those who reported last-month use of alcohol. *M* months, *D* days, *F* frequency, *Q-DO* quantity (i.e., number) of standard drinks per drinking occasion, *Max Q* maximum quantity, *HED* heavy episodic drinking. χ^2 test (for nominal variables) or Student's *t*-test (for continuous variables) was used to examine sex-related differences in substance use

¹Three participants did not report their gender

* *p* < 0.05

Table 3 Occurrence of tobacco and marijuana use: for the total sample and separate by gender and age categories

	Total ¹ n = 378	Girls n = 228	Boys n = 147	χ^2/It	13 n = 34	14 n = 88	15 n = 76	16 n = 106	17 n = 74
Tobacco									
Lifetime	38.6%	38.6%	39.5%	0.02	11.8%	28.4%	38.2%	48.1%	50%
12 M	30.4%	30.7%	30.6%	0.000	5.9%	26.1%	25.0%	39.6%	39.2%
30D	22.8%	20.6%	26.5%	1.16	0%	22.7%	15.8%	28.3%	32.4%
7D	12.2%	11.5%	13.6%	0.383	0%	8.0%	10.5%	16.0%	18.9%
F-30D ²	8.41 ± 9.67	7.55 ± 8.64	9.42 ± 10.77	0.88	-	3.28 ± 2.27	8.58 ± 9.60	10.18 ± 9.91	10.13 ± 11.77
Q-CD ²	4.81 ± 6.02	4.66 ± 6.64	5.00 ± 5.25	0.26	-	2.70 ± 1.92	6.25 ± 10.90	5.07 ± 5.60	5.54 ± 5.37
Marijuana									
Lifetime	14.8%	11.4%	20.4%	5.08*	0%	6.8%	13.2%	19.8%	25.7%
12 M	11.9%	9.2%	16.4%	4.39*	0%	6.8%	9.3%	16.0%	20.3%
30D	5.6%	3.1%	9.6%	7.08**	0%	2.3%	1.3%	10.4%	9.5%
7D	2.9%	1.8%	4.8%	2.88	0%	0%	1.3%	4.7%	6.8%
F-30D ³	9.24 ± 11.91	12.28 ± 13.45	7.71 ± 11.28	0.82	-	1.50 ± 0.71	1 ± 0.0 ⁴	6.18 ± 9.27	17.43 ± 14.25

For last-month (30D) frequencies and number of cigarettes (Q-CD), data are presented as means ± standard deviations. M months, D days, F frequency, Q-CD quantity (i.e., number) of cigarettes per smoking day, χ^2 test (for nominal variables) or Student's *t*-test (for continuous variables) was used to examine sex-related differences in substance use

¹Three participants did not report their gender

²Means and standard deviations were calculated among those who reported last-month use of tobacco

³Means and standard deviations were calculated among those who reported last-month use of marijuana

⁴Only one case within this age category reported marijuana use during the previous month

** *p* < 0.01; * *p* < 0.05

an average of 8.41 smoking days per month (i.e., an average of 40 cigarettes per month). Tobacco variables were not statistically different between girls and boys.

Marijuana Use

Lifetime use of marijuana in girls and boys were 11.4% and 20.4%, respectively (Table 3). Close to 6% reported marijuana use within the previous month while the occurrence of last-year marijuana use was twice higher. Overall, the occurrence of marijuana use was greater in boys than that in girls for all the marijuana variables, a difference that achieved statistical significance for lifetime, last-year, and last-month use.

Correlations

Among boys, parental injunctive norms, perceived risk associated with substance use, and all peer-related variables (i.e., descriptive and injunctive norms) were significantly associated with frequency of alcohol, tobacco, and marijuana use. Among girls, all these correlations, with the exception of the association between parental injunctive norms and last-month frequency of marijuana use, were statistically significant. For both boys and girls, the correlations involving descriptive norms appear to be slightly higher than those for injunctive norms. These results are presented in Table 4.

Table 4 Bivariate correlations between independent variables (injunctive norms, descriptive norms, and perceived risk associated with substance use) and substance use variables. Results are presented separated by gender

	Girls				Boys			
	IN-peer	IN-paren-tal	PR	Peer DN	IN-peer	IN-paren-tal	PR	Peer DN
Alcohol								
F-30D	0.14*	0.18*	-0.31***	0.46***	0.19*	0.37***	-0.31***	0.54***
F-30D HED	0.27***	0.22***	-0.38***	0.50***	0.18*	0.30***	-0.31***	0.58***
F-12 M	0.29***	0.23***	-0.37***	0.65***	0.26**	0.45***	-0.38***	0.69***
F-12 M HED	0.26***	0.22***	-0.33***	0.60***	0.29***	0.53***	-0.41***	0.65***
Tobacco								
F-30D	0.30***	0.15*	-0.16*	0.38***	0.38***	0.41***	-0.29***	0.36***
F-12 M	0.47***	0.23***	-0.30***	-0.30***	0.40***	0.36***	-0.35***	0.49***
Marijuana								
F-30D	0.20**	0.12	-0.19**	0.38***	0.32***	0.29***	-0.33***	0.44***
F-12 M	0.38***	0.16*	-0.29***	0.52***	0.44***	0.35***	-0.45***	0.61***

F frequency, *D* days, *M* months, *HED* heavy episodic drinking, *IN* injunctive norms, *PR* perceived risk associated with substance use, *DN* descriptive norms

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Multiple Regression Analysis

Frequency of HED

Among girls, all the variables explained 44% of the total variance (Table 5). Among boys, all the variables explained 58% of the total variance, which were 41% and 16% in two previous models. In two subsamples, parental injunctive norms and perceived risk associated with alcohol use were significantly associated with more frequent HED. The perception of a higher level of alcohol use among peers (descriptive norms), but not the perceived approval of alcohol use by the group of peers (injunctive norms), was significantly associated with greater frequency of HED. The effect of age was no longer significant while the effect of parental injunctive norms and perceived risk was reduced, yet still significant.

Frequency of Tobacco Use

Among girls, all the variables explained 38% of the total variance. Parental injunctive norms and perceived risk associated with tobacco use were significantly associated with more frequent tobacco use (Table 5). The perception of a greater level of peers' approval (injunctive norms) along with the perception of greater tobacco use among peers (descriptive norms) was significantly associated with more frequent tobacco use. The effects of age and parental injunctive norms were no longer significant while the effect of perceived risk was reduced yet was still significant. Among boys, all the variables explained 36% of the total variance. Parental injunctive norms and perceived risk were significantly associated with more frequent tobacco use (Table 5). Descriptive, but not injunctive, peer norms were significantly associated with more frequent tobacco use. The effects of age, parental injunctive norms, and perceived risk were no longer significant.

Frequency of Marijuana Use

Among girls, the set of included variables explained 33% of the total variance (Table 5). Parental injunctive norms and perceived risk associated with marijuana use were significantly associated with more frequent marijuana use. In the next step, the perceptions of a greater level of peers' approval (injunctive norms) along with the perception of greater marijuana use among peers (descriptive norms) were significantly associated with more frequent marijuana use. The effects of age, parental injunctive norms, and perceived risk were no longer significant. Among boys, the included variables explained 44% of the total variance (Table 5). Parental injunctive norms and perceived risk associated with marijuana use were significantly associated with more frequent marijuana use. In the next step, the perception of greater marijuana use among peers, but not the perception of a greater level of peers' approval, was significantly associated with more frequent marijuana use. The effect of age was no longer significant, while the effect of parental injunctive norms and perceived risk was reduced yet was still significant.

Table 5 Frequency of substance use regressed on demographics, perceived risk, and parental and peers' social norms (injunctive and descriptive). Results are presented separately by gender

	Girls (<i>n</i> = 228)										Boys (<i>n</i> = 147)									
	Age	PR	Parental IN	Peer IN	Peer DN	ΔR^2	R^2	Age	PR	Parental IN	Peer IN	Peer DN	ΔR^2	R^2						
HED																				
Step 1	0.266***					0.071	0.400***							0.160						
Step 2	0.245***	-0.274***	0.191**			0.130	0.292***	-0.239**	0.371***				0.250	0.411						
Step 3	0.090	-0.165**	0.121*	-0.067	0.564***	0.243	0.444	0.091	-0.140*	0.229***	-0.042	0.531***	0.169	0.580						
Tobacco																				
Step 1	0.138*					0.019	0.287***							0.082						
Step 2	0.103	-0.275***	0.199**			0.134	0.153	0.208*	-0.248**	0.195*			0.135	0.218						
Step 3	0.020	-0.126*	0.091	0.261***	0.366***	0.225	0.378	0.50	-0.157	0.141	0.103	0.385***	0.145	0.362						
Marijuana																				
Step 1	0.105					0.011	0.258**							0.067						
Step 2	0.069	-0.264***	0.135*			0.094	0.105	0.072	-0.358***	0.264***			0.216	0.282						
Step 3	0.005	-0.094	0.029	0.178*	0.440***	0.225	0.330	-0.046	-0.220**	0.163*	0.028	0.460***	0.158	0.441						

Three participants did not report their gender. Shown are standardized regression coefficients (Beta) associated with each regression coefficient; *HED* heavy episodic drinking, *IN* injunctive norms, *PR* perceived risk, *DN* descriptive norms. All ΔR^2 were significant at $p < 0.001$

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Discussion

The main finding was the high occurrence of alcohol use, which was consumed by 76% and 57% of the participants, during the previous year and previous month, respectively. These levels, derived from a sample aged 13–17 years, are higher to those found in high school students from the US (Adger & Saha, 2013; Hill & Mrug, 2015; Johnston et al., 2020; Patrick & Schulenberg, 2013; Wang et al., 2015) but quite similar to the average prevalence found in a large European survey (European School Survey Project on Alcohol and Other Drugs [ESPAD], 2015). Specifically, rates of alcohol use in US adolescents were 41.5%, 35.9%, and 18.7% for lifetime, last year, and last month, respectively (Monitoring the Future study [MTF]; Johnston et al., 2020), while the ESPAD averages for lifetime and last month were 80% and 48%, respectively. Moreover, lifetime and last-year occurrences of alcohol use found here were not largely different from those among Argentinean emerging adults (Pilatti et al., 2017), the age group with the highest prevalence of substance use, including here the prevalence of HED (Kuntsche & Gmel, 2013; Johnston et al., 2020; Secretariat of Integrated Policies on Drugs of the Argentine Nation, 2017; Schulenberg et al., 2018). Perhaps more worrying is that, among last-month drinkers, the mean of 4.9 standard drinks on a usual drinking occasion was not only indicative of HED but it was also higher than the mean number found at older age groups (Haas et al., 2012; Pilatti et al., 2019). Altogether, these findings highlight how prevalent drinking behaviors are among teenagers living in a culture/society that has traditionally exhibited substantial tolerance for, and acceptance of, drinking behaviors (Munné, 2005). This ubiquity of drinking behaviors, particularly HED, underscores the increased vulnerability of this young population to alcohol-related problems.

Supporting the notion that alcohol is the substance of choice among youth (Adger & Saha, 2013), the occurrence of tobacco use was half or less than half the occurrence of alcohol. Our findings suggest that this sample of Argentinean adolescents exhibit similar rates of cigarette smoking to those found among European adolescents (ESPAD, 2015 [46% and 21%, lifetime and last-month average prevalence, respectively]). Overall, Argentinean and European adolescents exhibit, compared to US adolescents, a higher occurrence of last-year (between 15 and 28%, Hill & Mrug, 2015) and last-month tobacco use (11%, Substance Abuse & Mental Health Services Administration, 2010). The MTF study (Johnston et al., 2020) found even lower rates (15.3% [lifetime] and 3.7% [last month]); however, those rates do not include other types of smoking products like vaping nicotine. Noteworthy, last-month tobacco users reported to smoke, on average, 40 cigarettes per month (based on mean frequency and mean quantity), emphasizing these students are at great risk for experiencing health problems, including tobacco use disorders (Onor et al., 2017; West, 2017).

Regarding marijuana, the rates found here were lower to those found by MTF (Johnston et al., 2020), where 30.6%, 25.2%, and 15.6% of adolescents reported lifetime, last-year, and last-month marijuana use, respectively. Again, our findings were fairly similar to the average prevalence found by ESPAD (2015), where 17% and 7% of the European students reported lifetime and last-month marijuana use. Considering that marijuana onset during adolescence markedly increased the rates of dependence from 9 to 17% (Hall & Degenhardt, 2009; Volkow et al., 2016), and that rates of nonmedical marijuana use have been consistently increasing in South America (Inter-American Drug Abuse Control Commission 2019), a sizable proportion of adolescents is at great risk for developing marijuana-related problems.

A central aim was to identify associations of three variables that hold promise as intervention targets to delay or reduce underage substance use, with the frequency of HED, tobacco, and marijuana use. HED frequency was associated with injunctive parental norms, descriptive norms, and perceived risk associated with alcohol use. These effects were fairly similar in boys and girls. Sex-related patterns were observed concerning frequency of tobacco use. Only descriptive norms were significantly associated with tobacco use in boys. Among girls, perceived risk and peer norms (both injunctive and descriptive) were significantly associated with this dependent variable. Similarly, peer injunctive and descriptive norms were significantly associated with marijuana use in girls, whereas boys exhibited a significant association between use of this drug and descriptive norms, perceived risk, and parental injunctive norms. These findings suggest that girls seem to be more sensitive to peer norms than boys, at least related to tobacco and marijuana use. This conclusion is consistent with results from the alcohol literature (Dir et al., 2017). Moreover, the marijuana literature has shown that girls are more sensitive than boys to peer's norms (Epstein et al., 2017), a phenomenon probably reflecting the more intimate personal bonds that are developed between girls compared to boys (Zaharakis et al., 2018). On the other hand, boys seem to be more sensitive to parenting behaviors and norms than girls, particularly in terms of marijuana use (Epstein et al., 2017). These findings support the idea that parents have a significant influence on adolescent substance use (Mrug and McCay 2013; Parsai et al., 2009) and suggest that targeting parental disapproval could be a promising alternative for interventions. Injunctive norms can be altered through information-based manipulation interventions (Jones et al., 2017; Prince & Carey, 2010; Ridout & Campbell, 2014). Indeed, some parent-based interventions to prevent or reduce underage substance focus on teaching parents to remain strict in their attitudes towards underage drinking (Bodin & Strandberg, 2011; Kuntsche & Kuntsche, 2016).

Descriptive peer norms were strongly associated with frequency of HED (Brooks-Russell et al., 2014), tobacco (Eisenberg et al., 2014), and marijuana use (Eisenberg et al., 2014; Roditis et al., 2016). Adolescents tend to overestimate rates of substance use in their peers, a misperception that has been targeted in interventions to reduce alcohol use (Valentin-Holbech et al., 2018). These interventions aimed at reducing substance use by dispelling the bias between real and perceived peer use. These campaigns, that have been relatively successful in reducing alcohol use (Neighbors et al., 2011a, 2011b, 2011c), might be also useful to target other substances.

In line with previous studies (Lipari et al., 2017; Pilatti et al., 2017, 2019), the perception of greater risk associated with substance use was significantly associated with the frequency of engaging in HED, tobacco, or marijuana use, with some sex-related differences. Perceived risk was associated with alcohol use in both sexes, whereas only girls or only boys exhibited a significant association between this variable and tobacco use and marijuana use, respectively. Notably, marijuana use in this study was significantly greater in boys than in girls, which may partially explain the sex-specific associations found between perceived risk and use of this substance. Previous studies have reported a strong association between perceived risk of marijuana use and actual marijuana use (Miech et al., 2017). It should not be underestimated the utility of teaching the risks associated with substance use (Lipari, 2013). Programs using nonjudgmental interventions to unveil the deficient knowledge about the risks associated with substance use and the discrepancies between substance use and the pursuit of personal goals have been effective to reduce alcohol-related problems in college students (Griffin & Botvin, 2010). Additionally, tackling social acceptance of substance use and media messages focused on benefits of substance use might be particularly helpful in societies where the use of specific substances is socially accepted or promoted — like alcohol use in Argentina — or is

dismissed as relatively harmless. Adolescents exposed to media messages about benefits associated with marijuana use were more likely to use marijuana than those without this media exposure (Roditis et al., 2016).

The present findings have some limitations. The cross-sectional design prevents from establishing causal or temporal conclusions. Unfortunately, we do not have exact data regarding how many students were enrolled in the schools and on how many parents/students refused to participate, which prevent us from estimating the rate of participation. This, along with the absence of a probabilistic sampling procedure, limits the generalization of the results. Other limitations are that we measured frequency but not quantity of marijuana use, nor asked about electronic cigarettes. Additionally, some of the bivariate correlations, particularly among girls, were low and, therefore, those associations should be interpreted with caution. Similarly, some of the effects found in the multiple regression analyses were significantly low, and some did not achieve significance. This suggests that other, unmeasured variables (e.g., parental monitoring, quality of family relationships) might be involved in these behaviors.

Despite these limitations, the present findings suggest that, in a culture characterized by high social acceptance of alcohol use, peers and parents are strongly associated with adolescent substance use (Mrug and McCay, 2013; Parsai et al., 2009). Thus, interventions targeted at increasing parent's disapproval of substance use (Bodin & Strandberg, 2011; Kuntsche & Kuntsche, 2016), reducing biases on descriptive and injunctive social norms on substance use (Griffin & Botvin, 2010), or increasing the perceived risk associated with such use may be valuable to deter from initiation or escalation of substance use during adolescence.

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Declarations

Ethics Approval Study procedures were reviewed and approved by the National Agency for Promotion of Science and Technology. The study was conducted in accordance with the declaration of Helsinki and it followed the ethical guidelines of the American Psychological Association (2016) and the Argentinean National Law for the Protection of Personal Data.

Informed Consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all participants for being included in the study.

Conflict of interest All authors declare that they have no conflicts of interest.

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