



## Association of tobacco, alcohol and illicit drugs use by early adolescents in Argentina with home-level and school-level socio-economic status

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### Abstract

In Argentina, tobacco, alcohol and drugs consumption among adolescents is a serious public health problem. Research focused in factors associated with students' substance use is needed to develop comprehensive preventive programs. The aim of this study was to determine if early adolescents attending to schools with lower parent educational level – and therefore schools with a lower expected socioeconomic status (SES) - are associated to tobacco, alcohol and illicit drugs use even after controlling for the effects of home SES. Data came from a cross-sectional survey of 3172 students from 1st year of 33 secondary schools in three Argentinean provinces (Buenos Aires, Córdoba y Tucumán). Multilevel logistic regression was applied to model the role of parental education (at individual and at school level) in predicting student substance use. Schools with lower parental education had a higher prevalence of smoking, susceptibility to smoke, drinking and drugs use ( $p < 0.02$ ), after adjustment for sex, age and parent education of the respondent. Parent education at individual level showed no association with these outcomes. Susceptibility to drink was not significantly associated to parental education at any level. These findings suggest a higher risk of addictions in early students from schools with disadvantaged SES measured by the average educational attainment of parents.

**Keywords:** tobacco, alcohol, drugs, adolescents, multilevel model.

### 1. Introduction

Alcohol, tobacco and illicit drugs use typically begin and escalate during adolescence and young adulthood (Chassin, 1996, Patrick, 2013). In Latin America 37% to 68% of adolescents had used tobacco, 43% to 80% alcohol and 4% to 23% marijuana (Oficina de las Naciones Unidas contra la Droga y el Delito, 2010). This prevalence is increasing and poses a significant risk to public health in the region. Data from 2012 and 2013 respectively shows that in Argentina one in four adults smoke and 10.4% of adults reported “heavy episodic drinking (Ministerio de Salud, 2014).

Previous studies have examined the relationship between poverty and tobacco consumption in adolescents and most of them have found a higher smoking prevalence among low socioeconomic status (SES) youth, reflecting the observed pattern in adults (Hanson, 2007; Hiscock, 2012). Furthermore, several studies have found an inverse relationship between alcohol and marijuana use among adolescents and SES (Lemstra, 2008; Kendler, 2014), although others suggest that the association is not so clear (Hanson, 2007; Jackson, 2014). Independently of the SES of their home, school SES are held to impact adolescent substance use because it is relating to social control, including social ties among peers and normative consensus (Lovato et al., 2010, Aveyard 2004). However, less is known about the impact of school SES on substance use independently of individual SES among adolescents from developing nations (Linetzky, 2012; Doku, 2010). Information of the SES of their families is difficult to collect from adolescents because they do not know or are not willing to reveal such information (Currie, 1997). Educational attainment of parents has been used in previous studies as a measure of youth SES (Harrell, 1998, Zhu, 1996), and it also has been argued that it is a stronger predictor than other SES indicators, such as household income (Goodman, 1999). In Argentina, tobacco, alcohol and drugs consumption among adolescents is a serious public health problem. Research focused in factors associated with students' substance use is needed to develop comprehensive preventive programs. The aim of this study was to determine if early adolescents attending to schools with lower parent educational level – and therefore schools with a lower expected SES - are associated to tobacco, alcohol and illicit drugs use even after controlling for the effects of home SES. To do this, we apply multilevel models to assess how consumption constraints operate both individually and at the aggregate level (Diez Roux, 2004).

## 2. Methods

*Study sample and procedure:* The study was conducted in Buenos Aires, the capital of Argentina and in two other large cities: Córdoba and Tucumán. Public and private schools who participated in the Global Youth Tobacco Survey (GYTS) 2007 were recruited in each city and other schools were added using a snow ball strategy. The selected schools were informed of the study and the school principals' cooperation was solicited. The surveys were administered to schools between May and July of 2014, and within each sampled school, we attempted to recruit every enrolled 8th grade student into the study. The research protocol was approved by an NIH-certified human subjects research board in Buenos Aires based at Centro de Educación Médica e Investigaciones Clínicas (CEMIC). Passive consent was requested from parents or caretakers and students signed an active consent form to allow follow-up contact for subsequent surveys. The self-administered questionnaires, administered by trained research staff, included questions about demographic, family and school characteristics, and tobacco, alcohol and illicit drugs consumption.

*Outcomes:* We examined two smoking outcomes. These included (1) current cigarette smoking (within the past 30 days), and (2) the susceptibility to smoke. A respondent was considered to be a current smoker if he or she had smoked cigarettes at least 1 day in the past 30 days (“During the past 30 days, on how many days did you smoke cigarettes?”), he or she were considered “ever smoker” if answered “yes” to any of the previous questions. Those who answered “definitely no” to the questions “Do you think you're going to smoke a cigarette in the next year?” and “If one of your best friends offered you a cigarette would you smoke it?” were considered “non-susceptible to smoking” (Pierce, 1996). We created similar outcomes for alcohol consumption: (1) current drinking (within the past 30 days), and (2) the susceptibility to drink. We examined one outcome for illicit drugs use: any use of marijuana, cocaine or paco (crack) in the past 12 months.

*Individual level variables:* Educational attainment of parents was used as proxy of home SES. We divided educational level of both parents in three categories: primary education for those who completed 7 years of formal education, secondary education for those who have completed 8 to 12 years and tertiary education those who have more than 12 years of formal education. Sex and age (continuous) were included in the analysis as control variables.

*School level variables:* Two proxy variables were used as proxies of school SES: percentage of students from 8th grade with both parents with at most 12 years of education (only primary or secondary education) and the school status (private or public).

*Statistical analysis:* Multilevel logistic regression models with random intercepts for school were used to determine the association between parental education (at individual and school level) and tobacco, alcohol and illicit drugs use outcomes, controlling by sex and age. At individual level, we used the educational level of the most highly educated parent of the student because mother and father education were significantly associated ( $r_s = 0.54, p < 0.001$ ). Separate models including only mother or father education level showed similar pattern of results (not showed). At school level, we first dichotomized the parent education of each student in: none of both parents with tertiary education (less than 12 years of education) versus some parent with tertiary education. Then, the percentage of students from each school with both parents with tertiary education was calculated. Models including type of school (i.e. private or public) instead of parent education were also adjusted. We estimated age (as a continuous variable) and sex adjusted odds ratios and 95% confidence intervals for each category. All data analyses were conducted with Stata V.13.0 (Stata Corp, College Station, TX, USA).

### 3. Results

The 33 participating schools included a total of 3,172 participants; 57.6% were male. The sample has an age range of 11 to 17 years; students from Córdoba and Tucumán were younger than those from Buenos Aires because secondary school begins one year early in these provinces. A majority of respondents (68.1%) attended to public schools. Table 1 shows demographic characteristics and the covariates included in the analysis of participants.

**Table 1. Individual level and school level characteristics of the sample**

Variable	Buenos Aires n (%)	Córdoba n (%)	Tucumán n (%)	Total n (%)
<i>Individual level</i>	1664 (52.5)	983 (31)	525 (16.6)	3172 (100)
Sex				
Female	627 (37.9)	396 (40.6)	312 (59.9)	1335 (42.4)
Male	1029 (62.1)	579 (59.4)	209 (40.1)	1817 (57.6)
Age (years)				
≤12	123 (7.4)	739 (75.3)	479 (91.2)	1341 (42.3)
13-14	1353 (81.4)	229 (23.3)	44 (8.4)	1626 (51.3)
≥15	186 (11.2)	14 (1.4)	2 (0.4)	202 (6.4)
Highest parent's education				
≤7 years	135 (9)	64 (7.6)	15 (3.3)	214 (7.7)
8-12 years	699 (46.6)	447 (53.3)	143 (31.2)	1289 (46.1)
>12 years	665 (44.4)	327 (39)	300 (65.5)	1292 (46.2)
Type of school				
Public	1551 (93.2)	515 (52.4)	93 (17.7)	2159 (68.1)
Private	113 (6.8)	468 (47.6)	432 (82.3)	1013 (31.9)
<i>School level</i>	15 (45.5)	10 (30.3)	8 (24.2)	33 (100)
Students by school range	21-330	59-160	12-123	12-330
% with some parent with education >12 years				
range	16.0-98.4	21.3-72.6	21.3-91.7	16.0-98.4
mean (SD)	47.2 (26.39)	38.7 (14.3)	68.2 (17.8)	49.9 (24.5)

Overall, 21.1% (n = 665) of the children had smoked at least a puff, and 10% (n = 314) were current smokers; 64.1.3% (n = 2020) were “ever drinkers”, 32.3% (1017) have drunk in the last 30 days and 17.2% (n = 540) referred an episode of binge drinking; 8.2% (n = 258) of respondents had consumed marijuana, cocaine or paco (crack) in the past 12 months. Table 2 shows prevalence of smoking, drinking and using illicit drugs by sex and city where the school is located.

**Table 2. Tobacco, alcohol and drugs consumption**

Outcome	girls	boys	Total	
Tobacco	Current smoker	143 (11,5)	171 (9,1)	314 (10)
	Never smoker	1031 (76,2)	1455 (80,7)	2486 (78,9)
	Susceptible to smoke*	294 (29,6)	362 (24,6)	656 (26,5)
Alcohol	Current drinker	420 (32,3)	597 (32,7)	1017 (32,3)
	Never drinker	507 (37,6)	625 (34,7)	1132 (35,9)
	Susceptible to drink*	115 (22,9)	150 (24,1)	265 (23,5)
Drugs	Ever marijuana, cocaine or crack	80 (6,5)	178 (9,2)	258 (8,2)

\*Susceptible to smoke and susceptible to drink were estimated among never smokers or never drinkers respectively.

For smoking, after controlling for age and sex, at individual level there was no significantly association between current smoking or susceptibility to smoke and home parent education. At school level we found that schools with lower parental education had a higher prevalence of current smoking (OR 1.24; 95% CI 1.10–1.40) and susceptibility to smoke (OR 1.10; 95% CI 1.04–1.17). For drinking, current drinking and susceptibility to drink were not associated with parent’s education at individual level. At school level we found that schools with lower parental education had a higher prevalence of current drinking (OR 1.08; 95% CI 1.01 - 1.16), but not a higher susceptibility to drink (OR 0.97; 95% CI 0.92 - 1.02). Also, drugs use was only associated with parent education at school level (OR 1.22; 95% CI 1.07 - 1.39). Table 3 describes the multilevel logistic regression models for all the categories studied.

**Table 3. Multilevel logistic regression of tobacco, alcohol and drugs consumption**

Outcome	Variables (Reference)	AOR	p	95% CI
Tobacco Current smoker	Individual level			
	Sex (boys)	1.36	0.03	1.03 - 1.79
	Age	2.30	0.001	1.97 - 2.67
	Parent with ≤ 7 years of education (>12 years)	1.28	0.301	0.80 - 2.02
	Parent with 8-12 years of education (> 12 years)	1.02	0.891	0,75 - 1.38
School level	Percentage of parent with ≤ 12 years of education	1.24	0.001	1.10 - 1.40
Susceptible to smoke	Individual level			
	Sex (boys)	1.36	0.001	1.15 - 1.61
	Age	1.60	0.001	1.43 - 1.76
	Parent with ≤ 7 years of education (>12 years)	1.33	0.076	0.97 - 1.81
	Parent with 8-12 years of education (> 12 years)	1.03	0.764	0.86 - 1.23

		School level	Percentage of parent with $\leq 12$ years of education	1.10	0.001	1.04 - 1.17
Alcohol	Current drinker	Individual level	Sex (boys)	0.97	0.75	0.81 - 1.16
			Age	1.76	0.001	1.56 - 1.99
			Parent with $\leq 7$ years of education ( $>12$ years)	1.16	0.370	0.84 - 1.61
			Parent with 8-12 years of education ( $> 12$ years)	1.17	0.086	0.98 - 1.41
			School level	Percentage of parent with $\leq 12$ years of education	1.08	0.02
	Susceptible to drink	Individual level	Sex (boys)	0.97	0.75	0.82 - 1.15
			Age	1.60	0.001	1.43 - 1.78
			Parent with $\leq 7$ years of education ( $>12$ years)	1.19	0.293	0.86 - 1.64
			Parent with 8-12 years of education ( $> 12$ years)	1.11	0.240	0.93 - 1.32
			School level	Percentage of parent with $\leq 12$ years of education	0.97	0.23
Drugs	Ever marijuana, cocaine or crack	Individual level	Sex (boys)	0.70	0.03	0.50 - 0.96
			Age	2.71	0.001	2.31 - 3.18
			Parent with $\leq 7$ years of education ( $>12$ years)	1.27	0.356	0.76 - 2.11
			Parent with 8-12 years of education ( $> 12$ years)	1.03	0.882	0.73 - 1.43
			School level	Percentage of parent with $\leq 12$ years of education	1.22	0.002

AOR adjusted odds ratio. Age and Percentage of parent with  $\leq 12$  years of education were entered as continuous variables. At school level, AOR is expressed for a 10% increase in Percentage of parent with  $\leq 12$  years of education.

Models including type of school instead of parent education were also studied. Parents of students from public schools had lower education: 62.2% did not completed 12 years of education compared with those from private schools were only 36.9%. However, models including type of school instead of parent education showed no association of this variable with the outcomes ( $p>0.05$ , not showed). This finding could be explicated by confusion with age. Students from public schools were – on average - one year older than those from privates (13.2 years versus 12.2 years, respectively). Accordingly, when we removed age from the models, type of school became significant for the same outcomes than the previous models.

#### 4. Conclusions

This study suggest that an association exists between SES of schools and smoking, drinking and using drugs among early adolescents in three large cities from Argentina. Current smoking, susceptibility to smoking, current drinking and drugs use were higher among students from schools with disadvantaged SES measured by the average educational attainment of parents. These findings are consistent with prior data showing SES to be associated with drugs use, alcohol and smoking outcomes among adolescents in developed countries (Hanson, 2007; Goodman, 1999) and developing nations (Linetzky, 2012; Doku, 2010). Using a multilevel approach allows us to establish how much of the variation in student's outcomes is conditioned by familiar circumstances and how much is related to differences between



schools. This study provides evidence of increased risk of addictions in adolescents attending to lower SES schools beyond the home SES level.

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