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Individual and contextual factors associated with tobacco, alcohol, and cannabis use among Chilean adolescents: A multilevel study



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ABSTRACT

We studied the association between individual and contextual variables and the use of tobacco, alcohol, or cannabis in the last 30 days preceding the study, considering the hierarchical nature of students nested in schools. We used the 7th Chilean National School Survey of Substance Use (2007) covering 45,273 students (aged 12–21 years old) along with information from 1465 schools provided by the Chilean Ministry of Education. Multilevel univariable and multivariable logistic regression models were performed. We found a significant intra-class correlation within schools for all substances in the study. Common (e.g., availability of pocket money, more time spent with friends, poor parental monitoring, poor school bonding, bullying others, and lower risk perception of substance use) and unique predictors (e.g., school achievement on national tests) were identified. These findings may help in planning and conducting preventive interventions to reduce substance use.

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1. Introduction

The use of tobacco, alcohol, or cannabis among Chilean adolescents is a major problem. The most recent prevalence survey conducted in Chile (2013) showed that 26.7% of 8th- (13–14 years old) through 12th-graders (17–18 years old) used cigarettes during the 30 days preceding the survey. The 30-day prevalence of alcohol and cannabis use were 35.6% and 18.8%, respectively ([Servicio Nacional para la Prevención y Rehabilitación de Drogas y Alcohol \(SENDA\), 2013](#)). The same figures in the United States for 2013 were 9.6% for cigarettes, 24.3% for alcohol, and 15.6% for cannabis ([Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2016](#)). In 2011, in Europe as a whole, 28% of students had smoked cigarettes, 57% had drunk alcohol, and 7% had used cannabis in the 30 days preceding the study. However, Europe had a large variation between countries.

Adolescence is a time of crucial developmental changes in the brain ([Colver & Longwell, 2013](#); [Luciana, 2013](#); [Steinberg, 2013](#); [Stiles & Jernigan, 2010](#); [Wetherill & Tapert, 2013](#)), and the use of a substance of abuse, specifically alcohol and cannabis,

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has a deleterious impact on brain functioning and structure (Battistella et al., 2014; Camchong, Lim, & Kumra, 2016; Jacobus, Squeglia, Bava, & Tapert, 2013; Lisdahl, Thayer, Squeglia, McQueeney, & Tapert, 2013; Lubman, Cheetham, & Yucel, 2015; Squeglia et al., 2012). Early substance abuse also has been associated with poor health and academic outcome (Ellickson, Tucker, Klein, & Saner, 2004; Hawkins et al., 1997). The study of the factors associated with adolescent drug use should aid development of more informed school-based preventive interventions.

Different individual, peer, and familial risk factors for substance misuse have been identified in several international studies (Berge, Sundell, Öjehagen, & Håkansson, 2016; Harakeh, de Looze, Schrijvers, van Dorsselaer, & Vollebergh, 2012; Hill & Mrug, 2015; Hughes, Lipari, & Williams, 2015; Kim & Chun, 2016; Moore & Littlecott, 2015; Park & Kim, 2015; Ryabov, 2015; Tomczyk, Hanewinkel, & Isensee, 2015; Walsh, Djalovski, Boniel-Nissim, & Harel-Fisch, 2014). The factors related to a higher frequency of smoking include getting into physical fights, experiencing anxiety (Kim & Chun, 2016), having a poorer perception of one's own health, and not progressing beyond a low educational level (Park & Kim, 2015). In addition, depressive mood was associated with alcohol, tobacco, and illegal drug use (Park & Kim, 2015). Having behavioral problems has been associated with drinking and cannabis use and peer smoking and drinking, and spending a lot of time with friends also has been associated with the use of multiple drugs (Harakeh et al., 2012; Tomczyk et al., 2015). Maternal drinking has been linked to smoking and drinking (Tomczyk et al., 2015), and having permissive parents has been associated with alcohol and cannabis use (Harakeh et al., 2012). On the other hand, authoritative parenting by parents who simultaneously provide both support and clear limits and norms was associated with less drinking (Berge et al., 2016). Many of these factors have been identified in other review studies (Monasterio, 2014; Tyas & Pederson, 1998).

Fewer studies have explored the association between school-related factors and substance use (Bonell et al., 2013; Fletcher, Bonell, & Hargreaves, 2008). The school climate is a strong and negative predictor of frequency of cannabis and other illicit drug use as well as of heavy episodic drinking (Ryabov, 2015). School socioeconomic status, independent of family income, has been associated with smoking and alcohol consumption (Moore & Littlecott, 2015). Commitment to school in high school appears to be strongly associated with a low risk of smoking (Gaete, Montgomery, & Araya, 2015), and strong anti-tobacco policies at school have been associated with less smoking (Galan et al., 2012; Paek, Hove, & Oh, 2013; Wiium, Burgess, & Moore, 2011).

Factor associations with the outcome cannot be considered as representing causal effects when using cross-sectional data. However, it is worth mentioning that, for example, in the case of youth antisocial behavior, some of the common risk factors found in observational studies to be associated (e.g., peer deviance) have a truly causal affect when studied using experimental or quasi-experimental studies or when applying some statistical innovations (Jaffee, Strait, & Odgers, 2012). Moreover, one Scottish longitudinal study found that smoking was more prevalent among students who reported disengagement with education and poor relationships with staff (West, Sweeting, & Leyland, 2004).

Studies exploring the association of such factors with substance use should consider the hierarchical nature of the data collected from schools (Aveyard, Markham, & Cheng, 2004; Aveyard, Markham, Lancashire et al., 2004; Hox, 2002). Pupil behaviors such as smoking and other substance misuse tend to be correlated within a school (Aveyard, Markham, & Cheng, 2004). Part of this correlation could be explained by the pupil composition, either by school selection or self-selection (e.g., family income, student academic performance) (Aveyard, Markham, & Cheng, 2004; Aveyard, Markham, Lancashire et al., 2004). However, part of this correlation may be explained by school contextual features independent of student characteristics (e.g., school location, school denomination, school size) (Aveyard, Markham, & Cheng, 2004; Aveyard, Markham, Lancashire et al., 2004). For example, some cross-sectional and longitudinal studies in developed countries (the UK and USA) using a multi-level approach have found that a "value-added" school measure (which assesses the extent to which schools achieved better than expected results and had lower than expected truancy) (Bonell, Fletcher, Jamal, Aveyard, & Markham, 2016) was consistently associated with lower rates of smoking and alcohol and drug use (Aveyard, Markham, & Cheng, 2004; Aveyard, Markham, Lancashire et al., 2004; Markham et al., 2008; Tobler, Komro, Dabroski, Aveyard, & Markham, 2011). When available, this or other school contextual factors should be assessed considering the influence of students' context.

Additionally, it is important to explore some of these school-related factors in other countries. We recently found an association between school-level factors, such as school bonding, school truancy, and school achievement, and smoking (Gaete, Ortuzar, Zitko, Montgomery, & Araya, 2016). However, in this study, and using a different methodology and additional data from the schools, the objective was to determine the association between individual and truly contextual school-related variables and having used tobacco, alcohol, or cannabis within the 30 days preceding the study, considering the hierarchical nature of students nested in schools.

2. Methods

2.1. Participants

This study used the Seventh National School Survey of Substance Use (2007) (Servicio Nacional para la Prevención y Rehabilitación de Drogas y Alcohol (SENDA), 2007) and the school data provided by the Ministry of Education of Chile. The School Surveys of Substance Use have been carried out by the government of Chile every two years beginning in 1999. In addition, individual self-report data were gathered from a nationally representative sample of 8th- (13–14 years old) to 12th-graders (17–18 years old). The 2007 survey collected data from 52,145 students attending 1512 schools. These data are

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