

A Cross-National Study of Pre-adolescent Substance Use:
Exploring Differences between Youth in Spain and Arizona

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ABSTRACT

This study aims to comparatively examine drug use in Arizona and Spain, in order to know if similarities and differences in drug use patterns justify the administration in Spain of U.S. prevention intervention programs. Data were obtained from independent samples of seventh-grade students recruited from urban public schools and surveyed in 1998: 4,035 ethnically diverse Arizona students (Latinos and non-Hispanic Whites), and 2,243 Spanish-White students. Comparisons using Odds ratios and Chi-square tests allowed assessment of differences in drug use rates between pre-adolescents in Arizona and Spain taking into account gender. Furthermore, ethnicity differences in pre-adolescent drug use and in psychosocial risk factors were explored using multivariate analysis (ANOVA and logistic regression). Our results showed similar trends in drug use between Arizona and Spain students, with gateway drugs already in use by early adolescents, and with higher rates of drug use among males than among females. However, cross-national differences in marijuana/cannabis use were noteworthy: Arizona pre-adolescents were over 25 times more likely to report marijuana/cannabis use than pre-adolescents from Spain. Moreover, when ethnic differences were considered, Latinos in Arizona reported higher marijuana/cannabis use compared with non-Latino students. Drug use patterns among Latino pre-adolescents, as well as the relevance of some risk factors among the diverse groups, were strongly influenced by their level of acculturation. Study limitations and the implications of our findings for early drug use prevention and future research are discussed.

Key words: pre-adolescents, substance use, cross-national, Spain, Arizona, gender, ethnicity

INTRODUCTION

Substance abuse among adolescents is an important public health problem both in the United States and Europe. Adolescent substance misuse has been related to other behavioral problems such as school drop-out, truancy, aggression, and antisocial behavior (Eggert & Randell, 2003; Donovan & Jessor, 1978). In addition, drug use during late childhood and adolescence may lead to diverse social and emotional problems during adulthood and, therefore, considerably impair psychosocial development (National Institute on Drug Abuse, 2003; Severson, Andrews, & Walker, 2003). The strong relevance of the drug use problem has promoted the development of prevention strategies in different countries (Ferrer-Wreder, Stattin, Lorente, Tubman, & Adamson, 2004). Usually, prevention programs that have been proven as efficacious in other contexts are selected for administration. In fact, many European countries have imported prevention strategies developed in the U.S., given that the better-known U.S. programs are supported by rigorous evaluation data. Within this context, the present study is aimed at comparatively examining drug use in Arizona and Spain, in order to know if similarities and differences in drug use patterns justify the administration in Spain of U.S. programs.

A shared aspect of efficacious preventive strategies is the emphasis on early drug use as a predictor of misuse in late adolescence and adulthood. In fact, recent research has demonstrated that individuals who initiate substance use in early adolescence are significantly more vulnerable to drug-abuse problems than those who initiate substance use during late adolescence or young adulthood (Duncan, Alpert, Duncan, & Hops, 1997). On the other hand, epidemiological research in the U.S. and Europe has recently shown that the use of substances such as alcohol, tobacco and cannabis is relatively common in pre-adolescents in different countries – hence the importance of giving attention to early substance use when analyzing the development of drug abuse. For example, recent findings from the Monitoring the Future (MTF) study of youth nationwide (Johnston, O'Malley, Bachman, & Schulenberg, 2006) indicate that substantial proportions of 8th to 12th graders in the U.S. continue to use substances, despite gradual declines in the percentages in the recent years. The 2005 MTF study (Johnston et al., 2006) found that alcohol use remained widespread among teenagers; 75% had consumed alcohol by the end of high school (17-18 years old), and 41% had so done by eighth grade (13-14 years old). The next most-used substance was cigarettes. More than half (50%) of students had tried cigarettes by twelfth grade and more than a quarter

(26%) had done so by eighth grade. Rates of marijuana/cannabis uses were somewhat lower, with 45% of students by 12th grade and 17% of students by 8th grade reporting lifetime use. The proportions of students reporting use of any illicit drug other than marijuana in their life were 27% by 12th grade and 12% by 8th grade.

In Spain, according to recent statistics, many types of substance use have been increasing in the last decade or remain at troublesome levels among adolescents. A 2004 national school-based drug survey sampled 25,521 students between 14 and 18 years of age from 573 public and private schools in Spain (Plan Nacional Sobre Drogas, 2004). Alcohol was the substance most frequently consumed by students, followed by tobacco and marijuana/cannabis. More than ninety percent (93.8%) of students reported lifetime use of alcohol by the end of high school (18 years old), and 59.2% of 14-year-olds have done so. Rates of tobacco use were similarly high, with 77.3% of 18-year-old and 42.1% of 14-year-old youth reporting lifetime uses. Rates of marijuana/cannabis use were somewhat lower, with 63.5% of 18-year-old and 19.6% of 14-year-old youth reporting lifetime use. The proportions of students reporting use of any illicit drug other than marijuana/cannabis in their life were 20.5% by 12th grade and 7.9% by 8th grade.

These epidemiological data indicate that substance use increases with age. Epidemiological data also show that use of the so-called "gateway drugs" becomes common in early adolescence. Initiation drugs, such as tobacco and alcohol, often lead to greater use of marijuana/cannabis, increasing, in turn, the risk of progression to other drugs such as cocaine, hallucinogens or other illicit substances. Moreover, it has been well documented that early adolescents who report any substance use may continue to use drugs in late adolescence, increase their use over time, and often progress to use of other drugs (see Duncan, Duncan, & Hops, 1998). These current findings from the research literature suggest that a careful study of early adolescent drug use could help to improve young-adult health outcomes. So, it is particularly relevant to examine drug use patterns in early adolescence, as well as common factors which, in different countries, are related to drug use onset.

Gender and ethnic differences in adolescent drug use

Research has shown that female and male adolescents have different drug-related behaviors. For example, U.S. epidemiological data on adolescent drug use indicate that, generally, males have higher rates of drinking and somewhat higher

rates of illicit drug use than females (Johnson et al., 2004). In Spain, epidemiological data indicate that, generally, there are gender differences in substance use, except for alcohol, for which rates are similar for males and females. Compared to boys, girls are more likely to report monthly tobacco use. For other substances, such as marijuana/cannabis and other illegal drugs, there is an inverse trend, with boys reporting higher rates than females. Another study in Europe, carried out in England by Rodham and associates (2005) reported similar results to those found in the Spanish data in a comparative analysis of cigarette and illicit drug use between females and males. However, in England males were more likely to use alcohol compared to females.

Considering the increasing geographical mobility and cultural diversity in Europe and beyond, ethnicity is another important variable when analyzing patterns of adolescent drug use. Alongside gender differences, ethnic and inter-cultural differences are attracting substantial attention in current studies, which consider ethnicity to be a powerful determinant of adolescent drug use (see, for example, Kulis, Marsiglia, & Hecht, 2003; Kulis, Marsiglia, & Hurdle, 2003; Rodham, Hawton, Evans, & Weatherall, 2005; Wallace et al., 2003). Most of these studies compare Hispanics to non-Hispanic adolescents. Yet, the composition of the Hispanic group is not the same across the different studies. Although many important studies consider Latino adolescents as an undifferentiated group (Schinke et al., 1992; Gil, Werner, & Tumban, 2004), other research has explored differences among Latino subgroups such as Mexican-Americans, Cuban-Americans, Puerto Ricans, and those with other Latin-American origins (e.g., Wallace et al., 2003; Suárez, & Randall, 1992; Vega, Zimmerman, Warheit, Apospori, & Gil, 1993).

Generally, these studies show a common trend, indicating fairly similar rates of tobacco and alcohol use among non-Hispanic Whites and Latinos in adolescence, with slightly higher rates among non-Hispanic Whites at older ages. When marijuana/cannabis rates are compared, this trend is inverted; although the differences are still slight, marijuana/cannabis rates are higher in the Latino group (Vega et al., 1993; Wallace et al., 2003; Warheit, Vega, Khoury, Gil, & Elfenbein, 1996). Another important finding is that there appear to be few significant differences among the various Latino subgroups (see Bachman et al., 1991; Warheit et al., 1996). Moreover, when differences were found, they were related more closely to levels of acculturation than to nativity.

The relevance of acculturation as a critical factor when predicting adolescent health-related behaviors

is well documented (e.g., Balls Organista, Organista & Kurasaki, 2003), and, thus, should be considered in the study of drug use. Some recent studies have acknowledged its power as a variable in adolescent drug use; such studies have evidenced the mediating effects of acculturation in the relationship between ethnicity and early adolescence drug use patterns (see Epstein, Botvin, & Díaz, 2000; Kulis, Marsiglia, & Hurdle, 2003; Vega & Gil, 1998).

Most research comparing drug use between Hispanic and non-Hispanic White adolescents has analyzed samples of U.S. students. This paper aims to provide a cross-cultural comparative analysis of prevalence and correlates of drug use, considering three populations: non-Hispanic Whites in the U.S., Latinos in the U.S., and Spanish Whites.

Research on adolescent drug use has consistently underlined the relevance of a vast array of social and psychological determinants. In this study, some of the most relevant factors were selected for an analysis of their effects on drug use in different adolescent populations. This selection is founded on the widespread evidence relating: a) Involvement with drug using peers to the onset/increase in drug use (e.g., Catalano & Hawkins, 1996), b) Refusal skills to lower rates of alcohol and tobacco use, as well as lower risk of substance abuse (e.g., Goosing, Marsiglia, & Hecht, 2003), c) Low school involvement to drug use onset (e.g., Manson & Dwindle, 2001), and d) Family bonding and good parent-child relations to a lower risk of drug use (e.g., Moon, Jackson, & Hecht, 2000).

This cross-cultural comparative analysis may provide valuable contributions to the literature on substance use and abuse. Firstly, in addition to providing a comparative analysis of adolescent drug use in two countries, this study includes the comparison of drug use between adolescents from different cultures, but with similarities potentially related to the degree of convergence in drug abuse patterns across the different groups. For example, Latino adolescents share language with Spanish adolescents, but Spanish cultural values seem to be closer to the cultural values of non-Hispanic Whites (e.g., individualism, goal-oriented behavior) (see Gosin, Marsiglia & Hecht, 2003; Elzo et al., 1999). On the other hand, acculturation in Latinos also seems to be relevant to the explanation of drug use patterns: more "acculturated" adolescents might show higher substance use rates, due to the loss of positive values from the origin culture and the adoption of behavioral patterns favorable to drug use, in an attempt to become integrated into the dominant culture.

Secondly, the samples considered in this study consist of males and females in 7th grade (12-13

years old). Many studies in the U.S. and Spain that describe adolescent drug use are carried out with samples older than 14 years. This study will compare pre-adolescent drug use in both countries, and will analyze whether the relationship between gender and drug use is the same in both samples. Finally, previous research on drug use in different ethnic groups has focused mainly on adolescents older than 8th graders. This study will extend this research by including pre-adolescent samples and analyzing whether drug use prevalence in different ethnic groups shows a pattern similar to the one found at older ages.

The data collected in our samples will allow us to address three main aims: First, to examine differences in drug use rates between pre-adolescents in Arizona and Spain taking into account gender. Second, to compare drug use rates between Spanish and U.S. pre-adolescents from different ethnic groups and at different levels of acculturation. Third, to examine and compare risk factors in pre-adolescents across the different groups.

METHODS

Participants

The data were obtained from independent samples of students in two countries, the U.S. and Spain. The two samples are part of separate longitudinal studies on the prevention of drug abuse during early adolescence that were designed to assess the effects of two preventive programs among middle-school students in the 1998-1999 and 1999-00 academic years. Both samples were recruited and surveyed in 1998. To meet the study aims and ensure comparability across samples, only pre-adolescent students (aged 12-13) were considered.

The U.S. sample is drawn from a southwestern state, Arizona (AZ), that borders on Mexico and contains a large Latino population predominantly of Mexican origin. Thirty five urban public schools were recruited there. The participating schools provided a population of 4,035 7th grade students (49.1% female; mean age = 12.41; SD=0.56). The 35-school sample sizes ranged from 56 to 725 student respondents per school. A large plurality of the Arizona students were Latino (79.9%), overwhelmingly of Mexican heritage. Less than one-fifth (18.8%) of the students were non-Hispanic White, and the remaining 1.3% were of various ethnic backgrounds (American Indian, African American, Asian American). The Latino sample was further divided in the analysis into two categories according to their level of linguistic acculturation: 1,535 pre-adolescents (55.3% of Latino students) who spoke English "mostly" or "exclusively" with

their friends and family were considered "more-acculturated," and the remaining 1,329 who were bilingual or Spanish dominant with family and friends were considered "less-acculturated."

For the sample in Spain, forty seven public schools were recruited in urban areas from 22 Spanish provinces. The participating schools provided a population of 2,243 students (45.1% female) in the first grade of Secondary Compulsory Education (mean age=12.46; SD=0.49). The sample sizes by province ranged from 54 and 476 students.

Procedures

Both in Arizona and Spain, parental consent was obtained. All the parents of the targeted grades received a letter signed by the school principal and the principal investigator. This letter provided information on the study aims and explained that the surveys would be anonymous, that participation would be voluntary, and that only the research team would have access to the individual-level survey data. The consent process was passive: students were recruited through an implicit parental assent.

Data were collected through self-reports provided by the pre-adolescents during regular classroom time. Students who were not willing to participate or whose parents refused to consent were assigned an alternative task while the survey was administered. Questionnaires were administered by trained research staff from the School of Social Work at Arizona State University, United States or from the Unit for Research on the Prevention of Conduct Problems at the University of Santiago de Compostela, Spain. In both sites, anonymity and confidentiality were guaranteed. The assessment procedures and human subjects protections in Arizona were approved by the local university's Institutional Review Board and the U.S. National Institutes of Health, while those in Spain were approved by the Spanish Department of Education.

Instruments and measures

The instruments used in Arizona and Spain were surveys elaborated by the research teams in their respective countries; the surveys were designed to: a) assess use of alcohol, tobacco and marijuana/cannabis; b) assess correlates of drug use in the peer, school, family and individual domains; c) be administered in the classroom setting in a 1-hour period; d) suit students aged 11 years or older; and e) be optically scannable.

In accordance with the objectives of this study, items that were shared by the Arizona and Spain surveys were selected for analysis. Specifically, 15 items from the original questionnaires were selected to provide information on demographics (age and

gender); lifetime use of alcohol, tobacco and marijuana/cannabis (one item each); recent use of alcohol and tobacco (one item each); extent of drug use by peers (three items); confidence in one's ability to refuse drug offers (or self efficacy) (two items); school satisfaction (one item); family relations (one item), and the usual grades received in school (one item).

The Arizona survey also included six items to assess ethnicity and a set of items to assess English-Spanish language usage that were combined to form an indicator of linguistic acculturation for Latino students. Although language use captures only one dimension of acculturation, it has been demonstrated to be comparable to multi-dimensional measures, accounting for up to 65% of the variance in acculturation status (Rogler et al., 1991; Samaniego & Gonzales, 1999). Language use relates to substance use in several ways. Children's English language acquisition and preference may erode family communication and protective ties because adults learn English more slowly than children do (Rogler, Cortes, & Malgady, 1991; Marsiglia, Miles, Dustman, & Sills, 2002). It may also introduce and reinforce behaviors of the mainstream culture, such as through pro-substance use images in mainstream English language media (Vega, Zimmerman, Warheit, Apospori, & Gil, 1997; Gilbert & Cervantes, 1986; Caetano, 1986; Dalton, Sargent, Beach, Titus-Ernstoff, Gibson, Ahrens, Tickle, & Heatherton, 2003). English language acquisition may also induce stress as the individual attempts to resolve conflicting cultural differences or to manage perceive ethnic discrimination, leading to coping via drug use (Beauvais, 1998; Gil & Wagner, 2000; Vega & Gil, 1998). In contrast, Spanish language maintenance protects adolescents by sheltering them from a developmentally driven expansion of their social networks that puts them at greater risk for encountering pro-drug peers and opportunities to use substances (Escobar, 1998). It also helps to preserve the protective, identity enhancing effects of maintaining cultural ties through continued use of Spanish (Chandler, Tsai, and Wharton 1999; Suarez-Orozco and Suarez-Orozco 1995; Chandler et al. 1999; Denner, Kirby, and Coyle 2001; Duncan et al. 1998; Flannery, Williams, and Vazsonyi 1999).

Substance use

Items for lifetime drug use and recent alcohol and tobacco use were administered in a comparable format in both surveys. To assess lifetime alcohol and tobacco use, Arizona students were asked to indicate how many drinks of alcohol they have had in their entire life; Spanish adolescents were asked how frequently they have used alcoholic drinks. To assess

lifetime tobacco use, Arizona students answered the question, "How many cigarettes have you smoked in your entire life?" Spanish students answered the question "Do you smoke cigarettes?" Lifetime marijuana/cannabis use was assessed by the question, "How many times have you used marijuana in your entire life?" in Arizona and by the question, "Have you ever used cannabis?" in Spain. To compare samples, these outcomes were dichotomized, with any affirmative answer to these items considered to indicate some lifetime use of the substance. Both in Arizona and Spain, recent alcohol use was defined as having used one or more alcoholic drinks during the last 30 days; recent tobacco use was defined as having smoked one or more cigarettes during the last 30 days.

Ethnicity/acculturation

Arizona students indicated their ethnicity by responding to six dichotomous (yes/no) items, which asked if they were (1) Mexican-American, Mexican, Chicano/a; (2) other Latino; (3) White (Anglo); (4) African-American (Black); (5) American Indian; or (6) Asian or Pacific Islander. For this study, only those subjects who reported membership in the first three categories (Latino or White) were utilized in the analysis; those groups constituted over 90% of the original sample. Students from other ethnic backgrounds were excluded from the analyses of the Arizona data because of their small sample size and heterogeneity.

The Latino group was further broken down by linguistic acculturation: English-Spanish language use. Students who chose to complete the questionnaire in Spanish, and/or who indicated that they spoke Spanish 'mostly' or 'exclusively' with their family and friends were considered to be Spanish dominant and "less-acculturated." Remaining Latino respondents were considered to be English dominant and "more-acculturated."

All Spanish respondents were native born and of the same ethnicity; so acculturation was not assessed.

Psychosocial variables

A three-item measure assessed friends' use of drugs. This measure is an average of scores for the items relative to friends' use of alcohol, cigarettes, or marijuana/cannabis. To capture the students' confidence in their ability to refuse an offer of alcohol, cigarettes, or marijuana/cannabis from friends and from a stranger, two yes-or-no items were used. Family relations were assessed through one item measuring closeness to parents scored from "not at all close" (1) to "very close" (5). Lastly, a single item captured the degree of students' school satisfaction: "I really feel I belong in this school," on

a scale from 1 (strongly agree) to 4 (strongly disagree).

All scales had good to excellent internal consistency as indicated by Cronbach's alpha coefficients (.75 to .86) (see Kulis, Marsiglia, & Hurdle, 2003; Gómez-Fraguela, Luengo, & Romero, 2003).

Statistical analyses

Three sets of analyses addressed the four research aims. First, to evaluate differences in drug use patterns between boys and girls in AZ and Spain, odds ratios and 95% confidence intervals were selected as the preferred analytic method. Odds ratios from bivariate logistic regression analyses offer an arithmetic contrast of one group relative to another group (in this case, females to males), and confidence intervals determine the statistical probability of the odds ratios occurring by chance alone. Second, significant differences in the prevalence rates of substance use among pre-adolescents in Arizona and Spain were identified using Chi-square tests based on crosstabular analyses. In the third set of analyses, differences in levels of substance use among four ethnic groups were assessed through Scheffé post-hoc tests following ANOVA. Lastly, we used multivariate logistic regression to explore simultaneously the role of gender, ethnicity and psychosocial risk factors in predicting drug use, and to examine whether risk factors differentially predicted drug use across the various national, ethnic and acculturation groups.

For the multivariate analyses, several variables were considered as controls. Students reported their gender, marking "male" or "female." Age was indicated by Arizona students by their birth date and by Spanish students by their age in years (10 to 19). The student's "usual grades in school", on a Likert scale from 1 (Mostly D & F's) to 3 (Mostly A & B's), were a self-reported global assessment of academic performance.

RESULTS

Rates of substance use

Table 1 compares the proportions of boys and girls who have used tobacco, alcohol and marijuana/cannabis in Arizona and Spain, and the odds ratios indicate the odds that girls used the substance relative to the odds that their male counterparts used the substance. Alcohol was the substance used most by males and females in the two samples, both for lifetime and monthly prevalence. In addition, females reported lower lifetime alcohol use than males both in Arizona and in Spain, as indicated by the significant odd ratios (i.e., those where the

lower and upper bounds of the 95% confidence interval remained below 1.0, or even odds). The same gender difference was found for recent alcohol use in the Spanish sample, but not in the Arizona sample. The next most frequently consumed substance was tobacco. In the Arizona sample, female tobacco use was lower than male use, both for lifetime and the last month use, but there were no significant gender differences in tobacco use in the Spanish sample. Lifetime marijuana/cannabis use was also significantly lower for females than for males both in Arizona and Spain.

Table 1 also suggests that there were cross-national differences in substance use prevalence within each gender group. Chi-square tests based on separate crosstabulations by gender showed that differences between males from Arizona and males from Spain were significant for lifetime alcohol and marijuana/cannabis use, and for last 30 day tobacco use ($\chi^2=12.388$, $p < 0.001$; $\chi^2=258.673$, $p < 0.001$; & $\chi^2=4.879$, $p < 0.05$ respectively). There were also significant differences between females from Arizona and females from Spain in the lifetime prevalence of alcohol and marijuana use ($\chi^2=28.07$, $p < 0.001$; $\chi^2=217.3$, $p < 0.001$), as well as in the prevalence of alcohol and tobacco use in the last month ($\chi^2=10.143$, $p < 0.001$; $\chi^2=13.332$, $p < 0.001$). The direction of these differences indicated that substance use was more common in Arizona than in Spain, with two exceptions: both females' and males' last-month tobacco use was higher in the Spanish sample. Notably, there were no cross-national differences in the prevalence of lifetime tobacco use for either boys or girls.

Ethnic differences in substance use

Figures 1 and 2 show mean drug use for males and females in each ethnic/acculturation group (means correspond to the proportions using substances). Lifetime alcohol, tobacco and marijuana/cannabis use was more common among more-acculturated Arizona Latino males and females than among Spanish males and females (see Figure 1). Regarding lifetime alcohol use, and comparing males to males and females to females, the more-acculturated Latino males and females differed significantly from Spanish males and females ($p < .001$) and from less-acculturated Latino males and females ($p < .001$). Regarding lifetime tobacco use, more acculturated Latinos differed significantly from a) both male and female non-Hispanic Whites ($p < .01$), b) Spanish males ($p < .05$), and c) less-acculturated Latina females ($p < .01$). Tobacco use among Spanish females was significantly higher than among non-Hispanic White females ($p < .05$). For lifetime use of marijuana/cannabis, scores were lower

across genders among Spanish students than among each of the other three AZ groups ($p < .001$); on the other hand, more-acculturated Latinos showed higher scores than the less-acculturated Latinos and non-Hispanic Whites of the same gender ($p < .001$).

When recent alcohol and tobacco use was considered (Figure 2), few differences were observed

among the groups. For recent alcohol use, the more-acculturated Latina females reported significantly higher scores than Spanish females ($p < .05$). For recent tobacco use, Spanish males and females had significantly higher scores than their non-Hispanic White counterparts ($p < .05$).

Table 1. Prevalence (percentages) of lifetime use of selected substances and recent use of alcohol and cigarettes among adolescents in Arizona and Spain, by gender.

		Boys	Girls	OR	95% CI
Arizona sample	Lifetime alcohol use	66.5%	61.7%	0.812	0.713, 0.924
	Lifetime cigarette use	43.4%	36.7%	0.757	0.666, 0.859
	Lifetime marijuana/cannabis use	25.6%	19.6%	0.705	0.608, 0.820
	Last 30 days alcohol use	22.6%	20.3%	0.860	0.739, 1.001
	Last 30 days cigarette use	12.2%	9.9%	0.795	0.651, 0.970
Spain sample	Lifetime alcohol use	60.3%	52.3%	0.722	0.609, 0.856
	Lifetime cigarette use	40.1%	37.1%	0.884	0.743, 1.051
	Lifetime marijuana/cannabis use	3.4%	1.1%	0.320	0.163, 0.626
	Last 30 days alcohol use	26.1%	14.3%	0.499	0.371, 0.672
	Last 30 days cigarette use	14.9%	14.4%	0.962	0.758, 1.220

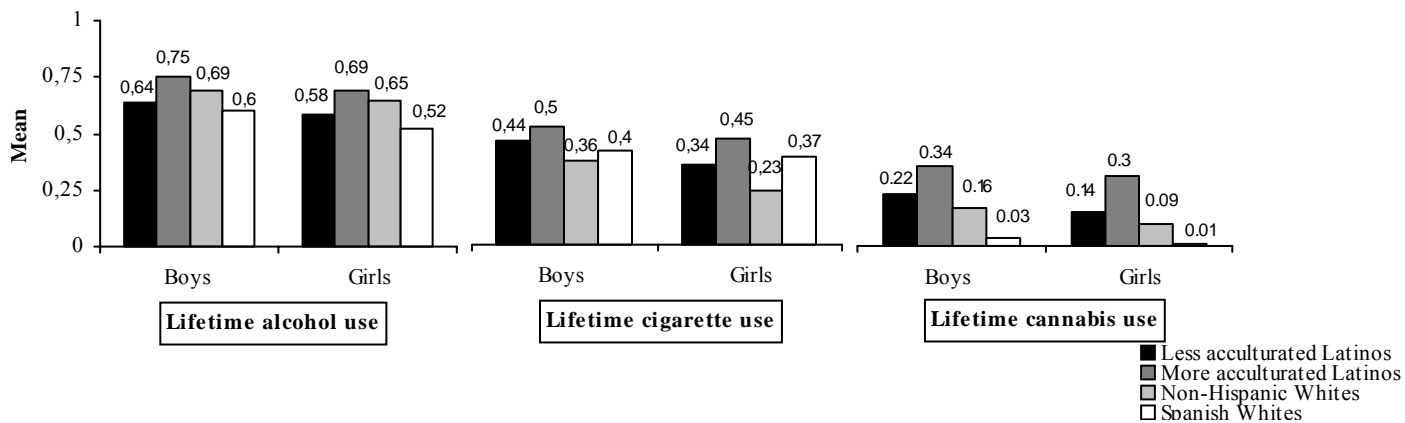


Figure 1. Mean lifetime alcohol, cigarette and cannabis use, by gender and ethnicity/acculturation

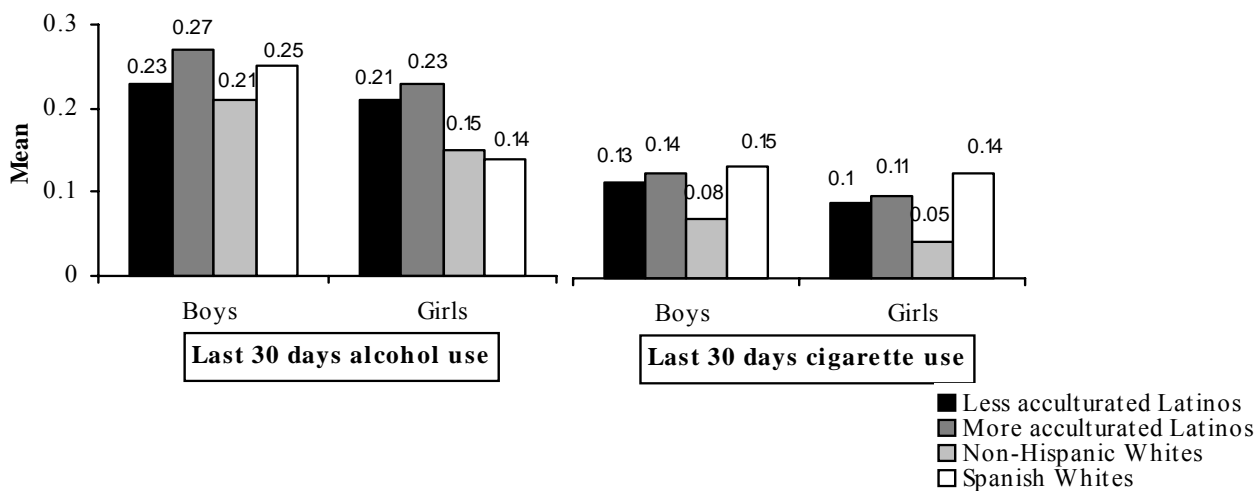


Figure 2. Mean recent alcohol and cigarette use, by gender and ethnicity/acculturation

Ethnic differences in factors related to drug use

Tables 2, 3, and 4 show logistic regression results of analyses of how drug use relates to national/ethnic/acculturation status and individual, peer, school and family factors. Because of the gender differences commonly found in drug use research, gender was introduced along with other control variables as predictors of drug use (Model I). Then, peer, individual, school and family factors were added as predictors (Model II), and finally, results were split by ethnicity/acculturation (Model III).

The combined-samples regressions in Models I and II showed that some of the differences in substance use rates between Arizona and Spain preadolescents were due to the influence of certain risk and protective factors for drug use. For example, for less-acculturated Latinos compared to Spanish youth, higher rates of lifetime alcohol and cigarette use as well as recent alcohol use appeared to be due to differences in risk and protective factors, as indicated by the substantial reduction in the size of the national/ethnicity/acculturation effects when “drug use by peers,” “refusal confidence,” “school satisfaction,” and “family relations” were controlled in Model II. This reduction also occurred for more-acculturated Latinos in lifetime cigarette use and recent alcohol use. Yet, despite controlling for these factors in Model II, several of the group differences remained significant: the higher level of cannabis use in all three Arizona groups than in the Spanish group; the lower rates of lifetime and recent cigarette use

among Arizona Whites compared to Spanish youth; and the higher rates of lifetime alcohol use among more-acculturated Latinos and non-Hispanic Whites than among Spanish youth. Another difference that did not appear in Model I but did achieve significance in Model II after the introduction of controls for risk and protective factors was the lower rates of recent cigarette use among the less acculturated and the more acculturated Latinos than among the Spanish youth.

The combined-samples regressions also showed some overall gender differences: as a group, boys from both countries were more likely than girls to use alcohol (lifetime and recent), cigarettes (lifetime) and marijuana/cannabis (lifetime), but the difference was reduced to non-significance in predicting recent alcohol and marijuana use after controlling for risk and protective factors (see Model II). In the analyses of the subgroup differences in the impact of risk and protective factors (Model II), results show that perceived peer drug use predicted greater lifetime and recent use of all substances. In addition, “refusal confidence” was inversely related to lifetime marijuana/cannabis use, and recent alcohol use. School satisfaction was inversely related to lifetime and recent alcohol and tobacco use. Lastly, good family relations significantly predicted less lifetime tobacco and marijuana/cannabis use and less recent tobacco use.

Table 2 Regression predicting lifetime alcohol, cigarette and marijuana/cannabis use

	Lifetime alcohol use						Lifetime cigarette use					
	I	II	III Less acculturated Latinos	III More acculturated Latinos	III Non- Hispanic Whites	III Spanish Whites	I	II	III Less acculturated Latinos	III More acculturated Latinos	III Non- Hispanic Whites	III Spanish Whites
	b	b	b	b	b	b	b	b	b	b	b	b
Less acculturated Latinos	0.223**	-0.67					0.209*	-0.105				
More acculturated Latinos	0.727***	0.379**					0.511***	0.111				
Non-Hispanic Whites	0.487***	0.314*					-0.276*	-0.513**				
Age	0.140*	0.033	-0.136	0.217	0.098	0.030	0.356***	0.253**	0.249	0.172	0.540*	0.218
Usual grades	-0.157**	-0.085	-0.312*	-0.077	0.453	-0.061	-0.253***	-0.176**	-0.325*	-0.118	-0.689*	-0.111
Gender: F = 0; M = 1	0.241***	0.239**	0.144	0.316	0.263	0.247**	0.187**	0.195**	0.240	0.307	0.761**	0.033
Drug use by peers		1.038***	1.043***	1.405***	0.993***	0.914***		1.469***	1.122***	1.206***	1.450***	1.674***
Refusal confidence		-0.034	-0.027	-0.748*	-0.290	-0.218		0.134	-0.273	-1.248***	-0.901*	-0.325*
School satisfaction		-0.307***	-0.316*	-0.313	-0.175	-0.337***		-0.213**	-0.292*	-0.027	-0.281	-0.185
Family relations		-0.101	-0.059	-0.018	-0.210	-0.112		-0.189***	-0.150	0.143	-0.100*	-0.370***
Intercept	-1.239	1.931	4.595*	0.559	0.415	1.948	-4.437***	-1.073	-0.634	-0.973	-3.488	0.968
N	3,976	3,976	913	786	394	2,021	3,965	3,965	915	788	395	2,008
Cox & Snell R Square	0.024	0.092	0.081	0.123	0.069	0.075	0.033	0.147	0.106	0.136	0.188	0.177

*p < .05; **p < .01; ***p < .001

Table 3 Regression predicting lifetime marijuana/cannabis use

	Lifetime marijuana/cannabis use					
	I	II	III Less acculturated Latinos b	III More acculturated Latinos b	III Non- Hispanic Whites b	III Spanish Whites b
Less acculturated Latinos	2.784***	3.031***				
More acculturated Latinos	3.526***	3.705***				
Non-Hispanic Whites	2.380***	2.713***				
Age	0.479***	0.371**	0.367	0.401*	-0.164	0.631
Usual grades	-0.638***	-0.534***	-0.898***	-0.351*	-0.410	-0.417*
Gender: F = 0; M = 1	0.229*	0.211	0.208	-0.008	0.605	0.730
Drug use by peers		2.054***	2.062***	1.820***	2.599***	2.365***
Refusal confidence		-0.774***	-0.747**	-1.434***	-1.434**	-1.065*
School satisfaction		-0.179	-0.383*	0.098	-0.325	0.041
Family relations		-0.140*	-0.087	-0.052	-0.145	-0.415*
Intercept	-8.641***	-5.579***	-1.625	-3.285	4.304	-9.410
N	3,972	3,972	915	783	395	2,018
Cox & Snell R Square	0.141	0.203	0.157	0.201	0.162	0.038

*p < .05; **p < .01; ***p < .001

Because differences in some outcomes by national/ethnic/acclimation groups persisted after adding other predictors in Model II, we proceeded to run the analyses separately by these sub-groups (Model III). Age differences in substance use, which for lifetime and recent alcohol use had been substantially reduced by entering risk and protective factors in Model II, failed to emerge as significant predictors of the alcohol outcomes in the Model III sub-group analyses. There were scattered effects of age on cigarette and marijuana outcomes for different Model III subgroups. Academic grades, which predicted all the outcomes except lifetime alcohol use

for the combined sample, was a significant predictor of of four of the outcomes for only one sub-group—the less acculturated Arizona Latinos. Grades did, however, predict less marijuana use for all sub-groups except Arizona non-Hispanic Whites. Gender differences emerged among only two sub-groups: Spanish males reported more lifetime and recent alcohol use than Spanish females, and a similar gender gap was found for cigarette use in the Arizona non-Hispanic White subgroup.

Table 4. Regression predicting recent alcohol and cigarette use

	Last 30 days alcohol use						Last 30 days cigarette use					
	I	II	III	III	III	III	I	II	III	III	III	III
	b	b	Less acculturated Latinos b	More acculturated Latinos b	Non- Hispanic Whites b	Spanish Whites b	b	b	Less acculturated Latinos b	More acculturated Latinos b	Non- Hispanic Whites b	Spanish Whites b
Less acculturated Latinos	0.387**	0.291					0.015	-0.615**				
More acculturated Latinos	0.546***	0.306					-0.050	-0.811***				
Non-Hispanic Whites	-0.042	-0.071					-0.678**	-1.210***				
Age	0.339***	0.211*	0.056	0.119	0.063	0.331	0.629***	0.498***	0.554*	0.385	0.244	0.530**
Usual grades	-0.345***	-0.251***	-0.313*	-0.187	-0.062	-0.110	-0.344***	-0.254***	-0.300	-0.270	-0.667	-0.181*
Gender: F = 0; M = 1	0.208*	0.178	-0.316	0.069	0.404	0.605**	-0.005	-0.005	-0.050	0.224	0.405	-0.129
Drug use by peers		1.802***	1.581***	1.379***	0.783***	2.203***		2.369***	1.649***	1.839***	2.390**	2.824***
Refusal confidence		-0.325**	-0.482*	-1.491***	-1.271**	-0.851***		-0.009	-0.809**	-1.010***	-1.383**	-0.761***
School satisfaction		-0.227**	-0.328*	0.017	0.143	-0.281*		-0.195*	-0.089	-0.080	-0.298	-0.213
Family relations		-0.060	-0.012	0.028	0.108	-0.223		-0.308***	-0.073	-0.216	-0.231	-0.405***
Intercept	-5.020***	-1.817	1.072	-0.679	-1.645	-3.172	-8.929***	-4.764**	-6.416*	-3.923	5.368	-4.911
N	3,046	3,046	916	786	394	1,089	3,982	3,982	918	790	394	2,021
Cox & Snell R Square	0.026	0.126	0.0106	0.142	0.119	0.193	0.027	0.118	0.079	0.090	0.091	0.171

*p < .05; **p < .01; ***p < .001

There were also patterns of subgroup differences in the risk and protective factors. Only one variable was a consistent predictor across all sub-groups and all outcomes: Drug use by peers significantly predicted less desirable outcomes in each sub-group. Refusal confidence predicted better outcomes for all subgroups, except in the case of lifetime alcohol and cigarette use among less acculturated Latinos, and in the case of lifetime alcohol use among Arizona Whites and Spanish youth. School satisfaction did not influence recent cigarette use in any national/ethnic/acclimation subgroup. It did, however, predict less use of substances among the less-acclimated Latinos on every other outcome, and less lifetime alcohol use among Spanish youth. Good family relations predicted less substance use only for the Spanish students, for whom it was inversely related to lifetime and recent cigarette use and lifetime cannabis use.

DISCUSSION

Using independent samples in Arizona and Spain, this study analyzed similarities and differences in drug use by pre-adolescent boys and girls and analyzed the influence of ethnicity on patterns and correlates of pre-adolescent drug use.

Our results support findings from previous studies that, at the onset of adolescence, gateway drugs are already in use (e.g., Duncan, Duncan & Hops, 1998) and that alcohol is pre-adolescents' drug of choice, followed by cigarettes and marijuana/cannabis (Johnston et al., 2006; Plan Nacional Sobre Drogas, 2004). Among both Arizonan and Spanish youth, males were at higher risk than females for lifetime alcohol and marijuana/cannabis use. Males in Spain, but not in Arizona, were at higher risk of using alcohol frequently than their female counterparts. However, in contrast to previous epidemiological studies in Spain (see Plan Nacional Sobre Drogas, 2004), the trend toward higher cigarette use among females relative to males was not found in the Spanish sample. The pattern was opposite among Arizona students, with higher rates of tobacco use among boys than among girls and with especially pronounced gender differences among the non-Hispanic White students. These results document that gender differences are already evident by early adolescence, with higher rates of substance use among boys, and suggest that at later ages, girls are likely to catch up with boys in some kinds of use (for example, alcohol use in Spain). Girls might even reach higher rates in some substances, as was the

case with tobacco in both the Spain and Arizona samples in this study.

Comparisons between Arizona and Spain samples allowed us to discover some cross-national differences in drug use. Pre-adolescents in Arizona were more likely than those in Spain to report lifetime alcohol and marijuana/cannabis use. The differences in lifetime marijuana/cannabis use are noteworthy: Arizonan pre-adolescents were over 25 times more likely to report having used marijuana/cannabis than Spanish pre-adolescents. These results were somewhat surprising, given that recent epidemiological studies in the U.S. and Spain reveal similar high rates of marijuana/cannabis use among adolescents over 14 years.

Two reasons might explain the higher marijuana/cannabis use rates in Arizona. First, the availability of marijuana/cannabis may differ between Arizona and Spain. In fact, the two-fold label we use in this paper ("marijuana/cannabis") reflects one difference between U.S. and Spain. Whereas in the U.S. it is common to smoke marijuana in less processed forms, in Spain it is common to use a cannabis derivative labelled "hashish" which is smoked in a mixture with tobacco. Differences in the supply of this substance might lead to differences in the availability for adolescents. Second, youth in Spain and Arizona at the age of youth in this study may be poised at a different educational thresholds that affect marijuana/cannabis use. The lower use of marijuana/cannabis among Spanish pre-adolescents may reflect the fact that at age 12-13 Spanish youth are still transitioning from elementary to secondary education, entering a new school, extending their relations to new teachers and peers (who may be different in age), and experiencing changes their family relations. Within this cultural setting, an apparently short time interval (1 year) might be long enough for risk factors to precipitate the onset of cannabis or other substance use beyond age 14. Differences between the school and family contexts before and after age 14 may not be so clear-cut for Arizona adolescents. In any case, given the cultural diversity of the U.S. sample, it seems necessary to attend to the variability among the various ethnic groups to fully understand the patterns of marijuana/cannabis use.

When lifetime marijuana/cannabis use rates among the various Arizona ethnic/acclimation groups were compared, higher use rates were found among Latinos than among non-Hispanic Whites. Within the Latino group, marijuana use was higher among more acculturated youth. These differences in marijuana use might be related to cultural aspects of Arizona Latinos that are not shared by non-Hispanic

Whites or even by Spanish pre-adolescents. An analysis of the depth and quality of such cultural aspects exceeds the objectives of the present study, but they might be an interesting focus for future studies. Our results clearly indicate that acculturation is a critical dimension when predicting differences in patterns of adolescent marijuana/cannabis use.

As predicted, lifetime use rates were considerably higher for more acculturated Latinos. However, these differences did not emerge for recent alcohol and cigarette use. In fact, when recent cigarette use was analyzed, Spanish pre-adolescents showed the highest use rate.

To further understand the effects of ethnicity/acculturation on drug use, we tested for interactions of ethnicity/acculturation with risk factors. For all outcomes except cannabis use, the differences between ethnic groups appear to be due largely to risk/protective factors, mainly “drug use by peers” and “refusal confidence.”

Drug use by peers emerged as the most consistent and important predictor of substance use in all the groups. The predictive power of refusal confidence was weaker for less acculturated Latinos and stronger for non-Hispanic Whites, more-acculturated Latinos, and Spanish youth. Value differences between Latino and non-Latino cultures might explain why refusal confidence was a less consistent predictor of substance use among less acculturated AZ Latinos than among the other groups (AZ whites, acculturated AZ Latinos and Spaniards) who now may share many mainstream European-American values. Less acculturated Latinos in the U.S., with close roots to traditional immigrant cultures may emphasize collective values (i.e., familism) (Sabogal, Marin, Otero-Sabogal, Marin & Perez-Stable, 1987) as the motivation for abstinence rather than the individualistic emphasis implied by refusal confidence or self-efficacy. Again, future studies should examine these hypotheses in depth.

School satisfaction was a more salient protective factor for less-acculturated Arizona Latinos and for Spaniards than for the other Arizona groups. Positive family relations appear more consistently salient to use of drugs other than alcohol by the Spaniards than to the Arizona groups. These results may be interpreted in the light of what is known about adolescent social development. Adolescents adopt behaviors that are consistent with attitudes and expectations of the social institutions, such as school and family, to which they are strongly linked (Catalano & Hawkins, 1996). Given this, strong school bonds would be related to a lower substance use among less-acculturated Latinos in Arizona, many of whom are from immigrant families and thus are more sensitive to issues of belonging or not

belonging in a school, particularly given their status as a numerical minority in some schools. Developers of culturally relevant programs focusing on prevention for the Latino community (e.g., *keepin'it REAL*, see Hecht et al., 2003) can build on this finding by addressing issues of belonging and institutional integration. Our finding of no effect of family relations on licit drug use among less-acculturated Latinos might be related to stronger tolerance of alcohol or cigarettes relative to illicit drugs, and to a relatively higher tolerance of alcohol use by males among Latinos (De La Rosa, 2002; Wycoff, 2000).

In Spain the social relevance of drug use in recent years has led to campaigns aimed to promote awareness among parents and schools of the drug use problem. Such policies might have promoted the development of school and family norms against “gateway drug” use. Therefore, a stronger bond with family and school may explain the lower use of tobacco and marijuana/cannabis among Spanish pre-adolescents although, as for Arizona Latinos, family bonding does not seem to be effective in protecting Spanish youth from alcohol use. This result could be explained by the permissive social norms towards alcohol use which still characterize Spanish society.

Limitations

The present findings must be considered in light of several limitations of the study. Both the Arizona and Spanish samples came from urban settings. While this condition makes the samples more similar, it also hinders the generalizability of results to non-urban populations in both countries. In addition, the Spanish sample did not include students from different ethnicities; future research should include other groups to enrich the results concerning ethnic influences on drug use. Another limitation of this study is that the results were based on self-reported measures, and it is possible that different reporting biases were operating in the two countries. We tried our best to control potential biases derived from self-reports: scales were equated, and those students who failed particular honesty criteria were eliminated from analyses. Finally, given that the assessment instruments were not developed specifically for this study (they belonged to two independent research studies), it was necessary to limit the number of the psychosocial variables selected as correlates of drug use. These variables are only a sample of the large number of individual, peer, family and school factors related to adolescent drug use. The present study is not intended to offer a reductionistic view of the framework of drug use correlates.

Conclusion

This study's objective was to examine similarities and differences in pre-adolescent drug use patterns to determine whether the adaptation of prevention programs is warranted. At this moment, drug use among youth is a troublesome fact in different cultures and societies; so the sharing of validated prevention experiences is important. A first step in program adaptation is to determine whether drug use patterns differ across contexts, and whether risk factors differentially influence drug use across populations. Our analyses identified similarities in drug use patterns among male and female adolescents in Arizona and Spain, as well as differences that are relevant for prevention in both contexts. Among similarities, it is noteworthy that, at early adolescence, "gateway drugs" were already in use in both countries, and that drug use rates were higher among males. So, it seems that prevention strategies in both contexts should aim to prevent gateway drug use, even in the youngest adolescent populations. However, the identified cross-national differences in marijuana/cannabis use indicate that this substance should be taken into account mainly by U.S. preventionists, and perhaps less so by Spanish preventionists, who should focus mainly on alcohol and tobacco.

Ethnic differences were also present in the rates of marijuana/cannabis use, showing a possible

influence of culture on drug use among Latino and non-Latino pre-adolescents. Cultural differences might also underlie the ethnic differences we found when examining predictors of drug use. For example, results showed that drug use by peers was the most powerful drug use predictor for all the groups, and that students' confidence in their ability to resist drug offers was more relevant for non-Latino adolescents than for Latinos, particularly those who were less acculturated. Many prevention strategies focus on training adolescents to resist drug use offers, with emphasis on resisting offers from peers. Given that the predictive power of refusal confidence differs across populations, it would be beneficial to examine how prevention programs should be adapted to match their emphasis on these components to the target populations.

The predictive power of family relations also differed across the various national groups. Our findings showed that family bonding was a powerful predictor of tobacco and alcohol use among Spanish students. Therefore, prevention programs for that population should make the family a privileged focus of intervention. Future research also could analyze in depth cultural differences within and across Spanish society and Latino and European-American societies in search of explanations for this finding.

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