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Smoking Behavior and Ethnicity in Jujuy, Argentina: Evidence from a Low-Income Youth Sample

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Abstract

Latin America is the world region with the highest rates of youth tobacco use and widest socioeconomic gaps, yet no data are available on smoking among Indigenous people, the largest disadvantaged group in the region. A self-administered survey of 3,131 8th grade youth enrolled in a random sample of 27 urban and rural schools was administered in 2004 in Jujuy, Argentina. Standard questions adapted from global surveys were used. Compared with youth of European background (11.4%; 95% CI 6.7–15.1), Indigenous (23.0%; 95% CI 21.0–25.0), and Mixed ethnicity (23%; 95% CI 18.9–27.1) youth had higher prevalence of current smoking. The odds of current smoking remained significantly elevated for Indigenous (OR 1.9; 95% CI = 1.1–3.3) and Mixed youth (OR 2.0; 95% CI 1.2–3.4) after controlling for confounders. Other risk factors that were associated with current smoking included: having any friends who smoke, repeating a grade in school, depressive symptoms in previous year, drinking any alcohol in the previous week and thrill seeking orientation. These results underscore the importance of social and cultural diversity aspects of the global tobacco epidemic.

Keywords

Tobacco use; adolescents; Latin America; ethnicity

Introduction

An estimated 250 million children alive today will eventually die from cigarette smoking and 70% of them live in low- and middle-income countries (Jha and Chaloupka, 2000). The Global Youth Tobacco Survey (GYTS and GYTSCG, 2002) revealed that Latin America is the world region with the highest use of tobacco by youth (22.2%), (Global Youth Tobacco Survey Collaborative Group, 2002; Warren, Jones, Eriksen, and Asma, 2006) but limited information is available on the impact of the tobacco use epidemic on disadvantaged population groups in this region. Race and ethnicity have been singled-out as enduring determinants of opportunities and welfare in Latin America where Indigenous people are at

a considerable disadvantage with respect to people belonging to predominantly European background. Indigenous people represent the largest disadvantaged group in Latin America and continue to suffer from lower education and a greater incidence of disease and discrimination (Psacharopoulos and Patrinos, 1984). The unequal distribution of resources that characterizes the region today follows a pattern set with specific traits of European colonization when institutions and policies were shaped to benefit elite population (Patrinos, 2005).

In contrast to recent trends in the United States, health research in Latin America has not usually used race and ethnic categories as essential explanatory variables of health behaviors and outcomes. However, given the legacy of discrimination and given the diversity within the region, race, and ethnicity are important factors to consider. American Indians in North America face similar challenges, as they have the highest smoking rates of all ethnic groups in the United States (Bachman et al., 1991; Johnson and Hoffman, 2000). Differential tobacco use by ethnicity seems likely to occur in countries across the world with diverse populations, however, few studies have focused on ethnic differences in tobacco use outside of North America (Best et al., 2001; Lee, Paul, Kam, and Jagmohani, 2005; Madu and Matla, 2003; Meijer, Branski, and Kerem, 2001; Nurk, Mittelmark, Suurorg, Tur, and Luiga, 1999; Rodham, Hawton, Evans, and Weatherall, 2005; Spein, Sexton, and Kvernmo, 2004; Swart, Reddy, Ruiter, and de Vries, 2003). Our study is the first to examine smoking patterns and risk factors among a sample largely constituting of Indigenous youth in Latin America. We used ethnic identity as a self-reported construct much like the US Census uses the category of race/ethnicity in defining major groups as Indigenous, European/White, or Mixed background. Our primary goal was to evaluate the role of ethnic identity on youth's smoking behavior and to assess the combined effect of ethnicity with demographic, family and school characteristics, and psychosocial risk factors.

Methods

Setting and Sampling Design

The study was conducted in the Province of Jujuy in northwest Argentina where about 44% of the population lives below the poverty level and the unemployment rates in recent years reached 25% (INDEC, 2001).

Secondary schools were randomly sampled from within the three geographic areas of the province: the mountain region; the provincial capital; and the agricultural lowlands. Secondary schools include 8th through 12th grades and reflect the standard private and public school organization in Argentina. Based upon government data in 2004, we estimated the number of 8th grade students within each region to equal 1,509, 7,296, and 5,379, respectively. The goal was to select a representative sample of schools containing approximately 1,000 8th grade students from within each geographic area (i.e., disproportionate stratification). The original sample of schools included 9 of the 17 schools within the mountain region, 6 of the 48 schools in the capital, and 9 of the 44 schools in the lowlands. The original set of schools was augmented by adding two schools in the capital region to over-sample students from poor urban areas. Furthermore, in the lowlands, two schools declined participation and were replaced by three additional schools from the same area. The final sample included 27 schools, 3 of which were private.

Study Procedures

We worked with the provincial government office that monitors substance and alcohol use. The selected schools were informed of the planned study and the school principals' cooperation was solicited. We provided modest incentives to the schools in the form of

supplies and training. There was no monetary compensation to youth or schools for collaboration. Spanish-language surveys were administered sequentially to schools between June and August of 2004, and within each sampled school, we attempted to recruit every enrolled 8th grade student into the study. All youths spoke Spanish and schools were conducted only in Spanish. School coordinators were trained on administration of the survey and trouble-shooting questions during the session. Surveys were self-administered in class with research staff and school coordinators present as proctors. In each school, one attempt was made to survey absentee students on a subsequent date.

The research protocol was approved by the UCSF Committee on Human Rights and 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.

Development of Questionnaire Measures

The questionnaire included translations of items used in surveys of adolescents in the US (Global Youth Tobacco Survey Collaborative Group, 2002) and items developed from our previous qualitative research. Items in English were translated and back translated and reviewed by three Argentinian investigators and two other Spanish-speaking research staff. Pilot testing of the instrument was conducted with students in rural and urban areas evaluating situational factors, content, characteristics of the respondents and time of administration (average of one hour). Instructions were developed to address the importance of providing accurate answers and the confidential nature of the survey.

Outcomes: Smoking Behavior

Smoking behavior questions were developed to be comparable to those used in the Centers for Disease Control and Prevention GYTS survey (Global Youth Tobacco Survey Collaborative Group, 2002) and included age at smoking initiation, number of cigarettes smoked in the lifetime, in the past 30 days and in the past week, and how many days in the past month and past week respondents smoked. Respondents were considered *ever smokers* if they tried at least a cigarette puff in their lifetime and never smokers had not tried even one puff. Current smokers were defined as having smoked at least one whole cigarette in their lifetime and at least one puff in the previous 30 days. Established smokers were defined as current smokers who had smoked at least 100 cigarettes in their lifetime. In order to address ceremonial use of tobacco among respondents who reported ever smoking, we asked in what place or situation they had first tried smoking and where they felt like smoking the most; responses that mentioned the Pachamama and Todos Santos traditional celebrations were included.

Exposure Variables: Demographics, Family and School Characteristics

Exposure or predictor variables included demographic, family and school characteristics. Respondents reported their sex, date of birth, age, religion, and if they were currently working. Ethnic self-identification was ascertained by providing a list of five ethnic categories to choose from: Indigenous, Mixed Indigenous and European (referred to as Mixed), European, Arab, and Other. Prior to including the ethnicity questions in the survey we completed qualitative work to evaluate whether youth were able to identify and distinguish among these ethnic categories. Family characteristics included parent's formal education and employment status, number of parents in the household (two vs. one or none), and family members speaking an indigenous language. We ascertained school location (rural, small town, urban), shift (morning, afternoon, evening) and type (public or private).

Exposure Variables: Psychosocial Risk Factors

Students reported on the presence of smokers in their household whether they ever repeated a grade in school, drinking at least one glass of alcohol in the previous week, and the number of their friends who smoked. Depressive symptoms were ascertained by asking a single item on whether the respondent in the past year felt sad and could not carry on his/her normal activities or obligations for at least two weeks (Benjet et al., 2007). The thrill-seeking orientation measure was adapted from one used with youth living in Florida and was measured with three items using a five-point disagreement-agreement response set: “I do not mind getting in trouble as long as I have fun”; “I like to do dangerous things”; “I like to do things that people say should not be done.” The measure had a range of 1 to 5 and we defined scores of 3 to 5 as high on thrill seeking, and less than 3 as low on thrill seeking and thus adapted the measure to use as a binary version of the scale (Vega, Warheit, Apospori, and Gil, 1993).

Expired Carbon Monoxide Validation

To evaluate potential under-reporting we measured expired air carbon monoxide (CO) using the Micro Medical Micro CO Meter. Respondents with 10 or more parts per million were considered to be current smokers. Expired CO was measured in a probabilistic sample of 452 respondents from one school in each geographic region of the province. The sample was selected proportional to school size.

Data Analysis

The sampling design was incorporated into all models by specifying geographic areas as strata and schools as clusters, as well as including weights to adjust for disproportionate stratification. In addition, a finite population correction was applied to adjust for the relatively large proportion of available schools sampled within each geographic area. Standard errors and confidence intervals were estimated via the Taylor expansion approximation (SAS, 2006). Because the data contained missing values, each substantive model was fit to 20 multiply imputed data sets created with SAS PROC MI (SAS, 2006). To accommodate the sampling design, separate imputation models were fit to the data from each geographic stratum, and each stratum-specific model included a set of indicators representing the sampled schools, or clusters (Reiter, Raghunathan, and Kinney, 2006). Imputed values for binary and categorical variables were rounded and truncated to the nearest category (Allison, 2002; Schafer, 1997). All parameter estimates and significance tests were calculated by combining results across the imputed 20 data sets (Meng and Rubin, 1992; Rubin, 1987).

Primary research questions included estimating total smoking prevalence, as well as within and across demographic groups defined by sex, age, and ethnicity. First, we conducted descriptive analyses to profile the sample examining the distribution of demographic, family and school characteristics, and psychosocial risk factors by ethnicity. Chi-square tests and *p* values were calculated. Bivariate contingency tables examined the pair-wise relationships among smoking outcomes, sex, and ethnicity.

Multivariate logistic models regressed the smoking outcomes (ever smoker, current smoker, and established smoker) onto demographic (sex, age, ethnic identity, currently working), family (parental education and employment status, number of parents in the household), school characteristics (location, type, and shift), and psychosocial risk factors (presence of smokers in the household, number of friends who smoke, repeating a grade, alcohol drinking, depressive symptoms, thrill seeking orientation). We estimated adjusted odds ratios and 95% confidence intervals.

For the “ever smoked” outcome, we additionally evaluated possible interactions between ethnicity and each risk factor. The modeling approach included all interactions and then removed the nonsignificant interactions ($p > .05$) via a backward elimination procedure, but all main effects were retained in the model.

Results

Participation Rate and Exclusions

The 27 participating schools included a total of 4,276 registered 8th grade students. Of those, 262 (6.1%) were absent on the days we attempted to recruit students into the study, and 324 (7.6%) declined participation, leaving 3,690 (86.3%) participants who completed the questionnaire. Within each geographic stratum the participation rates were 81.5%, 84.3%, and 91.5% for the mountain, capital, and lowlands regions, respectively. The analysis was focused on early adolescence and therefore the sample was restricted to the 3,180 students who were aged 13 to 15 years. Because categorization by ethnic identity was central to the analysis, the few respondents who self reported as Arabs ($n = 25$) or other ethnicity ($n = 12$) were excluded. Finally, given the focus on current smoking, 12 additional students who reported being former smokers were excluded for a total of 49 excluded participants and a final sample of 3,131 students.

Demographic Characteristics

Table 1 shows demographic characteristics by ethnic identity, 69% identified as Indigenous, 23% as mixed, and 8% as European. The sample had a greater proportion of girls than boys (54% vs. 46%) but this varied by ethnicity. Among Europeans the proportion of girls in school was lower than the proportion of boys (42% vs. 58%). The proportion of girls was greater among Indigenous (56% vs. 44%) and mixed (53% vs. 47%) youth. Nearly 40% of 8th graders in the analysis sample were above the grade-specific age of 13 years. The majority of participants were Catholic (85%), and 32% were working at the time of the interview. Over 40% of the respondents' parents had primary education or less, 22% were unemployed or on welfare, 70% of households had two parents, and an Indigenous language was spoken in 31% of households. Highest levels of parental education and employment were found among those who self-identified as Europeans; 31% of Europeans compared with 5% of indigenous parents had university degrees. Similarly, 80% of European parents were employed, compared with 69% of Indigenous parents.

The majority of schools in our sample were urban (65%), followed by 24% in small towns, and 12% in rural areas. The majority of students attended school during the day shift (60%), but there was a significant difference in the proportion of European (82%) and Indigenous youth (53%) who attended during this shift. A greater proportion of European youth (52%) attended a private school, compared with 6% of Indigenous youth. Regarding psychosocial risk factors, half of the students (48%) had five or more friends who smoked, the majority (76%) lived with an adult who smoked at home, and 23% had repeated a grade in school. Among our sample, 43% reported having depressive symptoms in the past year and 14% reported having an alcoholic drink in the past week, while 17% had a high score on thrill-seeking orientation.

Smoking Behavior

Half of the sample (50%) had smoked at least a puff, 20% were current smokers, and 5% were established smokers (Table 2). Current smoking (22%) and established smoking rates (5%–6%) were higher for Indigenous and mixed students compared with their European peers, among whom 11% were current smokers and 2% established smokers. Ever smoking rates were higher only among Indigenous (48%) and mixed (53%) girls compared with

European girls (34%); but not for Indigenous or mixed boys compared with European boys. There were no significant differences in smoking rates between girls and boys within each ethnic group.

Early initiation of smoking was common with 16.6% of the 1,540 youth who had ever smoked reporting their first cigarette by the age 10. Among current smokers ($N = 658$) 19.1% had smoked their first cigarette by age 10 and among established smokers ($N = 173$) 25.7% had tried their first cigarette by age 10. Figure 1 shows prevalence of current smoking by age and ethnicity. Older youth were consistently more likely to report current smoking. About 15.6% of all respondents smoked their first cigarette during traditional indigenous ceremonies and 14% stated that these ceremonies were the place where they “felt like smoking the most” at least some of the time. Among respondents who had ever smoked, 31.1% tried their first cigarette at a traditional ceremony and 27.4% stated that they “felt like smoking the most” at these activities.

A total of 427 students underwent CO measures corresponding to 11.6% of the total sample. Among students who reported that they were not smokers, only 1 (0.5%) had expired CO values of 10 ppm or more.

Multivariate Analyses

After controlling for demographic, family and school characteristics, and psychosocial risk factors, mixed ethnicity youth had increased likelihood of having ever smoked, compared with Europeans (OR 1.7; 95% CI 1.2–2.4); while the odds of being current smokers were double for Indigenous (OR 1.9; 95% CI 1.3–3.3) and Mixed ethnicity youth (OR 2.0; 95% CI 1.2–3.4) compared to Europeans. Factors consistently associated with increased risk across the three smoking outcomes included youth working at the time of the interview (OR 1.5–1.6), having more than five friends who smoked (OR 1.9–3.6), having repeated a grade (OR 1.3–1.4), reporting depressive symptoms in the past year (OR 1.4–1.7), thrill-seeking orientation (OR 1.6–3.5), and alcohol drinking in the past week (OR 3.5–6.9). On the other hand, having two parents in the household decreased the risk of all the three smoking outcomes (OR 0.7).

The final interaction analyses model included 4 interaction terms: ethnicity-by-school location; ethnicity by private school; ethnicity by depression; and ethnicity by current drinking. However, the only term that showed differential effects of risk factors by ethnicity was that the Indigenous respondents attending private schools were significantly more likely to ever smoke compared to their public school counterparts (OR 1.73; 95% CI 1.26–2.37), whereas European and Mixed background students attending private schools were nonsignificantly less likely to smoke. There were differential effects by ethnicity (European, Indigenous, and Mixed) of depression (OR 3.92, 1.29, 1.42, respectively) and alcohol use (OR 1.96, 6.98, 3.19, respectively), but these effects were positive in all groups.

Discussion

This is the first report that focuses on smoking behavior and ethnicity among youth in Latin America. Results showed that Indigenous and mixed ethnicity youth are at increased risk of smoking compared with youth of European descent. Smoking prevalence in our sample was slightly lower than GYTS rates for students of a comparable age group in the capital city of Buenos Aires where 55.1% were ever smokers and 25.3% were current smokers (1999–2001) (GYTS and GYTSCG, 2002). Regional comparisons show that the current smoking point estimate for the total sample in our study, 20.2% was slightly higher than the point estimate for the Americas 17.5% (GYTS and GYTSCG, 2003). Our sample had about twice the prevalence of current smoking among Latino youths living in the US (11%) and a

slightly lower prevalence compared with US American Indian youths (27%). Future research should explore whether smoking patterns among Indigenous youth in Latin America and US Indian youths are influenced by exposure to similar contexts of socioeconomic and cultural stress.

Our data show that Indigenous and Mixed ethnicity constitute significant risk factors in the initial and middle stages of the smoking trajectory, even after controlling for potential confounders. However ethnicity was not significant in the more advanced stage, established smoking, where in all likelihood the addictive power of nicotine and other risk behaviors like alcohol consumption, or mental health problems like depression, may play a more important role. In addition, use of a native language by family members was a significant risk only for ever smoking. Ethnic self-identification and language use are indicators of diverse social and cultural features that should be identified and explored with greater specificity to unveil their relationship with smoking behavior.

We found no significant differences in current smoking rates between boys and girls within the ethnic groups studied, a result consistent with current trends based on GYTS data (GYTS and GYTSCG, 2003). Furthermore, we found no evidence of an association of smoking with parental education level or employment status, except for a lower risk of ever smoking among those with unemployed parents. The latter could be due to economic barriers for purchasing cigarettes, or to cultural characteristics inherent to this segment of the population. Previous studies have shown inconclusive results regarding the association between socioeconomic status and youth smoking behavior (Arillo-Santillan et al., 2005; Muza, Bettiol, Muccillo, and Barbieri, 1997; Valdivia, et al., 2004). Evidence of a protective effect of two parent household (Isohanni, Moilanen, and Rantakallio, 1991; Otten, Engels, van de Ven, and Bricker, 2007) and religiosity on smoking behavior (Sinha, 2007; Weaver, Flannelly, and Strock, 2005) has been reported. In our study, evangelical religious affiliation had a protective effect on the initial stages of the smoking trajectory compared with youth who said they were Catholic. However, catholic youth had reduced risk compared with youth affiliated with other religions in the more advanced smoking stages. This finding grants further elucidation of cognitive and affective factors impacting youth of the different religious affiliations.

Another relevant finding was that the proportion of girls of Indigenous and of mixed descent that attended school was significantly greater than the proportion of boys. Given the disadvantaged socioeconomic characteristics of these two ethnic groups, boys may be more likely to drop out of school to engage in paid work, compared with Europeans. Working has been consistently shown to be a smoking risk factor for youths, therefore these population subgroups should be monitored and targeted for interventions (Valois, Dunham, Jackson, and Waller, 1999; Wakai, Miura, and Umenai, 2005).

Psychosocial risk factors consistently associated with smoking in our study were similar to those reported in the literature. The most salient relate to peer influences, thrill-seeking orientation and mental health problems (Biglan, Duncan, Ary, and Smolkowski, 1995; Conrad, Flay, and Hill, 1992; Global Youth Tobacco Survey Collaborative Group, 2002; Koval, Pederson, and Chan, 2004; Morello, Duggan, Adger, Anthony, and Joffe, 2001; Schepis and Rao, 2005; VanDeBreen, Whitmer, and Pickworth, 2004). The interpersonal and personal nature of these factors indicate that prevention strategies should be comprehensive and encompass environmental changes to reduce the social acceptability of smoking, while at the same time addressing the needs of youth with other risk behaviors and or mental health problems which increase the barriers for achieving a healthy development.

Study's Limitations

Our findings are subject to several limitations. The study did not include school drop outs. Although the percentage of out-of-school youth in the study site was low 0.8% (INDEC, 2005), the smoking behavior of this group should be monitored. Our data are based on self-reports from students who might under- or over-report their smoking behavior. Even so, responses to questions about cigarette smoking and other tobacco use have shown good test-retest reliability in U.S. students (Warren et al., 2006; Wills and Cleary, 1997) and self-reported smoking behavior is the standard used in evaluating youth throughout the world. Finally, the CO tests conducted in our study indicate that the incidence of under-reporting was low.

This is the first study in the Latin American region to show youth smoking behavior patterns by ethnicity. We identified significant differences in pattern of smoking by ethnicity with higher rates among all Indigenous groups compared to nonindigenous youth. Old age, employment, poor school performance, depressive symptoms, thrill-seeking attitudes, drinking alcohol and having five or more friends who smoke were associated with current smoking and these factors should be considered in development of prevention and cessation interventions. These findings are relevant to identifying prevention interventions in South America and underscore the importance of addressing the social and cultural diversity aspects of the global tobacco epidemic.

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Biography

Ethel Alderete, MPH, DrPH, Public Health Epidemiology and Behavioral Sciences, is a Professor of the Universidad Nacional de Jujuy, Argentina; Researcher of the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) and Director of the Institute of Regional Science and Technology (ICTER). Dr. Alderete, an Indigenous woman, is a WHO consultant for Indigenous Peoples health and has focused on the study of psychosocial risk factors for substance use and mental health problems, with a special interest in the reduction of health disparities among underserved populations.

Celia Patricia Kaplan is an Associate Adjunct Professor in the Division of General Internal Medicine, Department of Medicine, at the University of California, San Francisco and a member of the Medical effectiveness Research Center for Diverse Populations. She is a public health researcher whose career has focused on the processes and outcomes of medical care for minority populations. Currently Dr. Kaplan is the Co-Director of the Minority Task Force, which promotes recruitment and retention of minorities into UCSF cancer-treatment trials. Dr. Kaplan has an M.A. in Latin American Studies and a Dr.P.H. from the University of California, Los Angeles.

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Eliseo J. Pérez-Stable, M.D., is Professor of Medicine at the University of California, San Francisco (UCSF) School of Medicine and holds degrees from the University of Miami (B.A. and M.D.), trained in primary care general internal medicine at UCSF, and completed a research fellowship in general internal medicine. Dr. Pérez-Stable's research has focused on cancer control and prevention interventions for Latino populations and health care disparities and has been the principal investigator of 10 projects over 20 years. Dr. Pérez-Stable is Director of the UCSF Medical Effectiveness Research Center for Diverse Populations (MERC) that focuses on health and health care disparities in African American, Asian American, and Latino populations with a special emphasis on cancer, tobacco, and reproductive health. Dr. Pérez-Stable has led efforts in training of nearly 50 minority scientists from multiple disciplines over the past 14 years.

References

- Allison, PD. Missing Data. Sage Publications; Thousand Oaks, California: 2002.
- Arillo-Santillan E, Lazcano-Ponce E, Hernandez-Avila M, Fernandez E, Allen B, Valdes R, et al. Associations between individual and contextual factors and smoking in 13,293 Mexican students. *American Journal of Preventive Medicine*. 2005; 28(1):41–51. [PubMed: 15626554]
- Bachman JG, Wallace JM Jr, O'Malley PM, Johnston LD, Kurth CL, Neighbors HW. Racial/ethnic differences in smoking, drinking, and illicit drug use among American high school seniors, 1976–89. *American Journal of Public Health*. 1991; 81(3):372–377. [PubMed: 1994746]
- Benjet C, Borges G, Medina-Mora ME, Fleiz C, Blanco J, Zambrano J, et al. Prevalence and socio-demographic correlates of drug use among adolescents: results from the Mexican adolescent mental health survey risk. *Addiction*. 2007; (102):1261–1268. [PubMed: 17624976]
- Best D, Rawaf S, Rowley J, Floyd K, Manning V, Strang J. Ethnic and gender differences in drinking and smoking among London adolescents. *Ethnicity Health*. 2001; 6(1):51–57. [PubMed: 11388087]
- Biglan A, Duncan TE, Ary DV, Smolkowski K. Peer and parental influences on adolescent tobacco use. *Journal of Behavioral Medicine*. 1995; (18):315–330. [PubMed: 7500324]
- Conrad KM, Flay BR, Hill D. Why children start smoking cigarettes: predictors of onset. *The British Journal of Addictive*. 1992; 87(12):1711–1724.
- Global Youth Tobacco Survey Collaborative Group. Tobacco use among youth: a cross country comparison. *Tobacco Control*. 2002; 11(3):252–270. [PubMed: 12198280]
- GYTS; GYTSCG. Tobacco use among youth: a cross-country comparison. *Tobacco Control*. 2002; 11:252–270. [PubMed: 12198280]
- GYTS; GYTSCG. Differences in worldwide tobacco use by gender: findings from the Global Youth Tobacco Survey. *The Journal of School Health*. 2003; 6(73):207–215.
- INDEC. Censo Nacional de Población, Hogares y Viviendas 2001. Instituto Nacional de Estadísticas y Censo; Buenos Aires: 2001.
- INDEC. INDEC Anuario Estadístico. INDEC; Buenos Aires, Argentina: 2005.
- Hall, G.; Patrinos, HA. Indigenous peoples, poverty and human development in Latin America: 1994–2004. The World Bank; Washington: 2005. <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/LACEXT/0,,contentMDK:20505834~pagePK:146736~piPK:146830~theSitePK:258554,00.html>
- Isophanni M, Moilanen I, Rantakallio P. Determinants of teenage smoking, with special reference to non-standard family background. *The British Journal of Addictive*. 1991; 86(4):391–398.

- Jha, P.; Chaloupka, F. Tobacco control in developing countries. Oxford University Press; Oxford: 2000.
- Johnson RA, Hoffman JP. Adolescent cigarette smoking in US racial/ethnic subgroups: findings from the National Education Longitudinal Study. *Journal of Health Social Behavior*. 2000; 41:392–407.
- Koval JJ, Pederson LL, Chan SS. Psychosocial variables in a cohort of students in grades 8 and 11: a comparison of current and never smokers. *Preventive Medicine*. 2004; 39:1017–1025. [PubMed: 15475037]
- Lee LK, Paul CY, Kam CW, Jagmohani K. Smoking among secondary school students in Negeri Sembilan, Malaysia. *Asia Pacific Journal of Public Health*. 2005; 17(2):130–136. [PubMed: 16425658]
- Madu SN, Matla MQ. Illicit drug use, cigarette smoking and alcohol drinking behaviour among a sample of high school adolescents in the Pietersburg area of the northern province, South Africa. *Journal of Adolescent*. 2003; 26(1):121–136.
- Meijer B, Branski D, Kerem E. Ethnic differences in cigarette smoking among adolescents: a comparison of Jews and Arabs in Jerusalem. *The Israel Medical Association Journal*. 2001; 3(7): 504–507. [PubMed: 11791417]
- Meng X, Rubin DB. Performing likelihood ratio tests with multiply-imputed data sets. *Biometrika*. 1992; 79(1):103–111.
- Morello P, Duggan A, Adger H Jr, Anthony JC, Joffe A. Tobacco use among high school students in Buenos Aires, Argentina. *American Journal of Public Health*. 2001; 91(2):219–224. [PubMed: 11213790]
- Muza GM, Bettiol H, Muccillo G, Barbieri MA. Consumption of psychoactive substances by school-age adolescents of Ribeirao Preto, SP (Brazil). II–Distribution of consumption by social levels. *Revista De Saude Publica*. 1997; 31(2):163–170. [PubMed: 9497564]
- Nurk E, Mittelmark MB, Suurorg L, Tur I, Luiga E. Trends in tobacco use among Estonian and Russian youth in Tallinn. *Scandinavian Journal of Public Health*. 1999; 27(4):301–305. [PubMed: 10724475]
- Otten R, Engels RC, van de Ven MO, Bricker JB. Parental smoking and adolescent smoking stages: the role of parents' current and former smoking, and family structure. *Journal of Behavioral Medicine*. 2007; 30(2):143–154. [PubMed: 17221319]
- Patrinós, HG. Indigenous peoples, poverty and human development in Latin America: 1994–2004. Washington, DC.: 2005.
- Psacharopoulos, G.; Patrinos, HA. Indigenous people and poverty in Latin America: an empirical analysis. The World Bank; Washington: 1994. http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&siteName=WDS&entityID=000009265_3970311123315
- Reiter JP, Raghunathan TE, Kinney S. The importance of modeling the sampling design in multiple imputation for missing data. *Survey Methodology*. 2006; 32(2):143–149.
- Rodham K, Hawton K, Evans E, Weatherall R. Ethnic and gender differences in drinking, smoking and drug taking among adolescents in England: a self-report school-based survey of 15 and 16 year olds. *Journal of Adolescent*. 2005; 28(1):63–73.
- Rubin, DB. Multiple imputation for nonresponse in surveys. John Wiley & Sons, Inc.; New York: 1987.
- SAS Institute Inc.. (Publication no. SAS OnlineDoc® 9.1.3). SAS Institute; Cary, NC: 2006.
- Schafer, JL. Analysis of incomplete multivariate data. New York: Chapman & Hall; London: 1997.
- Schepis, Ty. S.; Rao, U. Epidemiology and etiology of adolescent smoking. *Pediatrics*. 2005; 117(5): 607–612.
- Sinha JW, Cnaan R, Gelles RJ. Adolescent risk behaviors and religion: findings from a national study. *Journal of Adolescent*. 2007; 30(2):231–249.
- Spein AR, Sexton H, Kvernmo S. Predictors of smoking behaviour among indigenous sami adolescents and non-indigenous peers in north Norway. *Scandinavian Journal of Public Health*. 2004; 32(2):118–129. [PubMed: 15255501]

- Swart D, Reddy P, Ruiter RA, de Vries H. Cigarette use among male and female grade 8–10 students of different ethnicity in South African schools. *Tobacco Control*. 2003; 12(1):e1. [PubMed: 12612381]
- Valdivia G, S. F. Cumsille P, Ramirez V, Hidalgo CG, Palma B, Carrasco J. Smoking habit in school age children, in Chile. *Revista Medica De Chile*. 2004; 132(4):521.
- Valois RF, Dunham ACA, Jackson KL, Waller J. Association between employment and substance abuse behaviors among public high school adolescents. *Journal of Adolescent Health*. 1999; 25(4): 256–263. [PubMed: 10505843]
- VanDeBreen MB, Whitmer MD, Pickworth WB. Predictors of smoking development in a population-based sample of adolescents: a prospective study. *Journal of Adolescent Health*. 2004; (35):172–181. [PubMed: 15313498]
- Vega ZR, Warheit GJ, Apospori E, Gil AG. Risk factors for early adolescent drug use in four ethnic and racial groups. *American Journal of Public Health*. 1993; 83(2):185–189. [PubMed: 8427320]
- Wakai K, Miura H, Umenai T. Effect of working status on tobacco, alcohol, and drug use among adolescents in urban area of Thailand. *Addictive Behaviors*. 2005; 30(3):457–464. [PubMed: 15718063]
- Warren CW, Jones NR, Eriksen MP, Asma S. Patterns of global tobacco use in young people and implications for future chronic disease burden in adults. *Lancet*. 2006; 367(9512):749–753. [PubMed: 16517275]
- Weaver AJ, Flannelly K, Strock AL. A review of research on the effects of religion on adolescent tobacco use published between 1990 and 2003. *Adolescence*. 2005; 40(160):761–776. [PubMed: 16468670]
- Wills T, Cleary S. The validity of self-reports of smoking: analyses by race/ethnicity in a school sample of urban adolescents. *American Journal of Public Health*. 1997; 1(1):87.

Figure 1.
Current smoking by ethnicity and age Jujuy, Argentina 2004.

Demographic, family, and school characteristics and psychosocial risk factors of 3,131 youth age 13 to 15 years by ethnicity, Jujuy, Argentina, 2004

Table 1

	Indigenous N = 2,151 (68.7%)	Mixed N = 733 (23.4%)	European N = 247 (7.9%)	Total N = 3,131	p Value
Demographics					
Sex					
Girls	55.8	53.5	41.6	54.1	0.002
Boys	44.2	46.5	58.4	45.9	
Age (in years)					
13	60.0	62.1	77.2	61.9	0.132
14	28.2	25.9	16.3	26.7	
15	11.8	12.0	6.5	11.4	
Religion					
Catholic	84.5	83.7	90.6	84.8	0.156
Evangelist	11.7	10.2	6.7	11.0	
Other	3.8	6.12	2.7	4.3	
Currently working	34.2	30.8	21.8	32.4	0.084
Family characteristics					
Parent's education level					
None	8.1	7.0	3.4	7.5	0.000
Primary	35.8	28.5	17.4	32.6	
High school	36.2	32.9	27.8	34.8	
Technical	14.5	19.0	19.7	15.9	
University	5.4	12.6	31.7	9.2	
Parent's employment status					
Employed	68.9	74.4	83.2	71.3	0.005
Welfare	18.8	16.0	7.4	17.2	
Unemployed	5.9	3.6	3.5	5.2	
Retired	6.4	6.0	5.9	6.2	
Two parent household	73.1	69.4	73.4	70.2	
Indigenous language spoken in the family	32.4	30.7	20.8	31.1	0.184
School characteristics					
Location					

	Indigenous <i>N</i> = 2,151 (68.7%)	Mixed <i>N</i> = 733 (23.4%)	European <i>N</i> = 247 (7.9%)	Total <i>N</i> = 3,131	<i>p</i> Value
Urban	62.9	65.5	76.8	64.6	0.471
Small town	25.8	20.7	16.5	23.9	
Rural	11.3	13.9	6.7	11.5	
Shift					
Day	53.3	64.2	81.8	58.1	
Afternoon	42.4	32.7	15.7	38.0	
Night	4.4	3.1	2.5	3.9	0.000
Private school	5.8	20.9	52.1	13.0	0.000
Youth's psychosocial risk factors					
Adults smoke at home	75.8	76.2	79.3	76.2	0.684
Friends who smoke					
None	25.8	24.67	29.2	25.8	0.896
1-4	21.8	27.0	21.8	26.6	
5+	47.2	48.4	49.0	47.6	
Repeated a grade	24.3	21.9	13.0	22.8	0.276
Depressive symptoms in past year	44.2	42.1	37.8	43.2	0.303
Thrill seeking orientation	16.4	17.2	20.6	16.9	0.250
Alcohol drinking in past week	13.9	14.3	11.2	13.8	0.698

Note: *p* values refer to chi square of variable by ethnicity.

Table 2
Cigarette smoking by sex and ethnicity among 3,131 youth, age 13 to 15 years, Jujuy, Argentina 2004

	Ever smoker			Current smoker			Established smoker		
	Girls (%) (SE) 95% CI	Boys (%) (SE) 95% CI	Total (%) (SE) 95% CI	Girls (%) (SE) 95% CI	Boys (%) (SE) 95% CI	Total (%) (SE) 95% CI	Girls (%) (SE) 95% CI	Boys (%) (SE) 95% CI	Total (%) (SE) 95% CI
European	34.4 (5.9) 28.5–40.3	46.5 (6.6) 39.9–53.1	41.5 (5.8) 30.2–47.3	12.7 (5.3) 7.4–18.0	10.4 (4.7) 5.7–15.1	11.4 (4.7) 6.7–16.1	2.2 (1.9) 0.3–4.1	2.4 (1.4) 1.0–3.8	2.3 (1.5) 0.8–3.8
Mixed	52.9 (3.7) 49.2–56.6	54.3 (3.9) 50.4–58.2	53.6 (3.3) 50.3–56.9	21.5 (2.6) 18.9–24.1	23.0 (4.1) 18.9–27.1	22.2 (3.0) 19.2–25.2	6.6 (1.7) 4.9–8.3	5.5 (1.6) 3.9–7.1	6.1 (1.2) 4.9–7.3
Indigenous	47.5 (2.2) 45.3–49.7	51.1 (3.2) 47.9–54.3	49.1 (2.5) 46.6–51.6	20.5 (1.7) 18.8–22.2	23.0 (2.0) 21–25	21.5 (2.6) 18.9–24.1	5.0 (0.7) 4.3–5.7	6.8 (1.1) 5.7–7.9	5.5 (0.7) 4.8–6.2
Total	48.0 (2.2) 45.8–50.2	51.4 (2.9) 48.5–54.3	50.2 (2.2) 48.0–52.4	20.2 (1.7) 18.5–21.9	21.7 (2.7) 19–14.4	20.2 (1.7) 18.5–21.9	4.9 (0.7) 4.2–1.6	6.0 (1.1) 4.9–7.1	5.4 (0.7) 4.7–6.1

Note: Percentages shown are based on total sample of girls, boys, or both.