

## Using the Global-School-Based Student Health Survey to Identify Correlates of Smoking in Chilean Youth

**Randy Page, PhD<sup>1</sup>**

Author<sup>1</sup> is affiliated with the Department of Health Science at Brigham Young University. **Contact author:** Randy Page, Department of Health Science at Brigham Young University, Provo, UT, 84604, United States; **Phone:** 801-422-1131; **Fax:** 801- 422-0273; **Email:** randy\_page@byu.edu.

Submitted May 19, 2009; Revised and Accepted November 18, 2009

---

### *Abstract*

*Despite the fact that Chilean youth have the highest smoking prevalence in Latin America and among the highest adolescent smoking rates in the world, little research has investigated correlates of youth smokers in Chile. Therefore, the objective of this study was to identify correlates of current smoking among Chilean adolescents. The sample consisted of 8131 students in grades 7<sup>o</sup> primary, 8<sup>o</sup> primary, and 1<sup>o</sup> secondary (basically ages 13-15) representing four of Chile's regions who completed the Global School-Based Student Survey (GSHS). Logistic regression showed that the strongest predictors of smoking were involvement in health-risk behaviors. Smokers were likely to get drunk, use drugs, have sexual intercourse, and get into physical fights. They were also likely to miss school without permission. Other significant predictors were gender, grade level, parental tobacco use, parents' awareness of free time, feelings of sadness/hopelessness, and participation in physical activity. The results indicate the need for more intense and varied smoking prevention efforts in Chile including parent-based interventions, taking into account psychosocial distress, and addressing the range of risky behaviors that co-occur with engagement in smoking behavior.*

**Key words:** *Adolescents, Smoking, Adolescent Behavior, Health Promotion.*

---

## Introduction

It has been reported that Chile has among the highest youth tobacco smoking prevalence in the world. The Global Youth Tobacco Survey (GYTS), conducted from 1999 to 2001, reported that youth in Chile had the highest rate of smoking among youth in 43 countries around the world and the highest of the 24 countries in the Region of the Americas.<sup>1</sup> Youth smoking prevalence (current smoking) among students enrolled in schools aged 13-15 ranged from 36.1% in Valparaiso to 38.4% in Santiago and 39.6% in Coquimbo. The overall median per cent of current smoking across the 43 countries in the GYTS was 13.9%, so the prevalence rate in Chile was almost three times the median rate globally for the countries involved in the survey. More recent analysis of GYTS data collected from 140 countries between the years of 2000-2007 showed that there were only 8 countries where 30% or more of the youth 13-15 years old smoke, and Chile was among those countries.<sup>2</sup> In fact, only youth in the Cook Islands and Papua, New Guinea smoked at a higher prevalence than the Chilean youth. The specific data representing Chile in the GYTS cross-national study was from students in Santiago, where it was found that 33.9% of the students smoked cigarettes in the past month (current smoking). A much higher percent of the Santiago girls (39.2%) reported smoking than boys (27.5%).

Chile's Ministry of Interior reports that among youth 12-18 years of age that current smoking fell from 27.1% in 1994 among males to 25.6% in 2004, but increased from 21.1% to 25.9% over the same years.<sup>3</sup> According to Araneda and Cumsille, among students in primary (basico) grade 8° through secondary (medio) grade 4° in 2003, 35.1% of males and 40.8% of female reported current smoking.<sup>4</sup> Current smoking was reported among students by 24.0% of primary grade 8°, 33.1% of secondary grade 1°, 41.4% of secondary grade 2°, 47.9% of secondary grade 3°, and 51.8% of secondary grade 4°. The 38% of students who smoke in Chile in these grades is much higher than the 28.8% of students in Spain and 24.3% in the U.S. of comparable age who smoked cigarettes in the same year (2003) These data from Spain are from its Ministry of Interior and for the United States are from the Monitoring the Future Study.<sup>5,6</sup>

Unfortunately, data on youth smoking prevalence in Chile in the international literature is limited to the data reported above. More studies are needed to determine if these high rates of smoking have

continued beyond 2004 and whether prevention programming has impacted the high smoking rates reported in 2004 and earlier. In August 2006, Chile enacted new legislation that set strict regulations on cigarette advertising.<sup>7</sup> The new law banned tobacco advertising in the media and near schools, as well as prohibiting the selling of cigarettes to minors within a 100-meter radius of schools. Further, the legislation prohibited smoking in many public places and the mandating that all cigarette packs carry warnings that take up half of both sides of the pack. According to Bonnefoy, smoking prevention in Chile is weak and although some education programs geared at students have been implemented, they are not extensive or coupled with public information campaigns.<sup>7</sup> Also, prevention measures and the effects of new anti-smoking laws in Chile have not been measured. Unfortunately, there is also evidence that since the early 1990s, multinational tobacco companies have promoted "youth smoking prevention" programs widely throughout Latin America, and even partnered with education and health ministries in several countries in doing so.<sup>8</sup>

In response to the high smoking prevalence in this nation, Caris et al.<sup>9</sup> advocate for research investigating characteristics of Chilean youth smokers because this research "may give clues as to what public health measures might be more or less effective in reducing the tobacco-smoking prevalence in both Chile and other nations" (p. 85). Their research investigated the association between behavioral problems and tobacco smoking among adolescents in all 13 of the administrative regions in Chile. They found that the likelihood of smoking among youth with the highest level of behavioral problems was about twice that of those with the lowest levels of problems. The behavioral problems investigated included: teasing or doing harmful things to animals, swearing, teasing others, threatening to hurt others, doing risky or dangerous things, and taking advantage of others. Valdivia et al.<sup>10</sup> reported that students of lower socioeconomic levels were at increased risk of smoking in Chile and that students in the central region of the country were more likely to be smokers than those in the south or north. They also found that those with a father or mother who smoked had higher risk of being smokers.

Given the need for greater understanding of the problem of youth smoking in Chile, the current research examined data collected from Chilean youth in the Global School-Based Student Survey (GSHS) to gain greater understanding about Chilean youth smokers. GSHS data was analyzed to determine

multivariate association of current smoking with the following variables: gender, grade level, region, parental tobacco use, parental monitoring and understanding, mental health (feelings of sadness/hopelessness, loneliness, and worrying), at-risk for becoming overweight, missing classes or school, and a number of health risk (getting drunk, using drugs, having sexual intercourse, being in a physical fight, at risk for becoming overweight) and protective behaviors (being physically active, eating fruits and vegetables). These variables were selected for inclusion because research conducted in other countries indicates that they may help explain adolescent smoking behavior.<sup>11,12</sup>

The Global School-based Student Health Survey (GSHS) has been implemented by Ministries of Health and Education in many countries with assistance from the World Health Organization (WHO).<sup>13</sup> The GSHS can be implemented at little cost within countries and serves as a surveillance tool for a country to periodically monitor the prevalence of important health risk behaviors and protective factors related to the leading causes of morbidity and mortality worldwide. It is a school-based survey conducted primarily among students aged 13–15 years.

## Methods

### Sampling and Data Collection

This study utilized the 2004 GSHS which was conducted in four different areas of Chile: the Santiago Metro region, Región de Tarapacá (Region 1), Región de Valparaíso (Region 5), and Región del Biobío (Region 8). Throughout the four regions, a representative sample of students was selected to participate from grades 7<sup>o</sup> primary, 8<sup>o</sup> primary, and 1<sup>o</sup> secondary. In all, 8,131 students completed the survey. The school response rate was 100% for all four regions. For the Metro region, student and overall response rates were 85% and included 2,111 students.<sup>14</sup> Region 1 and Region 5 both had student and overall response rates of 86% and included 2,033 and 2,016 students respectively.<sup>15,16</sup> Region 8 had student and overall response rates of 87% and 1,971 students.<sup>17</sup>

The 2004 GSHS administration in the four regions in Chile followed the standardized sampling and survey administration process developed by WHO. WHO describes the sampling as a two-stage probability sampling technique, where in the first stage the primary sampling units are schools selected with a

probability proportional to their enrollment size.<sup>13</sup> The second step is the random selection of classrooms within a selected school. Students complete surveys voluntarily and anonymously within the selected classrooms, and their responses are recorded on computer-scanable answer sheets.

The authors of the current study were not involved in the data collection in Chile. This study was approved by the authors' institutional review board committee.

### Instrument

The instrument for this study was the Chile 2004 GSHS Questionnaire.<sup>18</sup> This questionnaire includes questions about alcohol and other drug use, tobacco use, mental health, hygiene, physical activity, dietary behaviors, sexual behaviors, violence and unintentional injury, and protective factors. GSHS core questionnaire modules measure the most important health behaviors and protective factors among students.

The current study focused on cigarette smoking and determined current smoking status (smoked in the past 30 days) by response to the item: "During the past 30 days, on how many days did you smoke cigarettes?" Other items and responses from the Chile GSHS Questionnaire used in the study as study variables included those dealing with: parental tobacco use (neither parent, father/male guardian, mother/female guardian, both, do not know); parental monitoring and understanding (frequency in which parents check homework, understand problems and worries, know what is being done with free time); mental health (feelings of sadness/hopelessness, loneliness, and worrying); missing classes or school without permission; at risk for becoming overweight; and health risk behaviors (getting drunk, using drugs, having sexual intercourse, being in a physical fight missing classes without permission) and protective behaviors (being physically active, eating fruits and vegetables). An additional variable was at-risk for becoming overweight, which represented students who were at or above the 85<sup>th</sup> percentile but below the 95<sup>th</sup> percentile for body mass index by age and sex based on reference data from Cole et al.<sup>19</sup>

The GSHS questionnaire has been administered by Ministries of Health and Education in several countries throughout the world. Yet, unfortunately, there is not data provided by any of the individual countries administering the survey, or the World Health Organization or U.S. Centers for Disease Control which provide technical assistance to countries implementing the survey, concerning the

reliability of the GSHS or its items. However, the concept of measuring aspects of adolescent health risk behaviors using self-report is well-established. For example, the U.S. Youth Risk Behavior Survey, which uses items very similar to that used by the GSHS has a kappa statistic reliability of 61-80% or higher on several items measuring youth health risk and health protective behaviors.<sup>20</sup> However, it should be recognized that the reliability and validity of survey items is highly likely to vary from youth in different countries due to cultural and other differences.

While it would be possible to determine internal consistency reliability of the survey items by calculating Cronbach's alpha statistics, this would be an inappropriate indicator of reliability in this situation. Internal consistency reliability determines the degree to which the items in an instrument are related to each other (internally consistent). Because the intent of the GSHS is to measure distinct health risk and protective behaviors with individual items (e.g., cigarette smoking, feeling lonely, participation in physical activity) the internal consistency was not considered in order to treat each of the items as distinct health risk or health protective behaviors.

### Data Analysis

All prevalence estimates of current smoking and other percentages reported in this study were adjusted weight percentages. They were statistically adjusted for age and grade level and also weighted in the following manner. Weighted percents were calculated by applying a weighting factor to each student record in each country, country region, or city to adjust for non-response and for the varying probabilities (likelihood) of selection. This weighting factor is applied in an identical way to GSHS variables in each country survey where GSHS has been implemented.<sup>21</sup> The following formula was used to calculate the weighting factor,  $W = W1 * W2 * f1 * f2 * f3$ . Where:

W1 = the inverse of the probability of selecting the school.

W2 = the inverse of the probability of selecting the classroom within the school.

f1 = a school-level non response adjustment factor calculated by school size category (small, medium, large). The factor was calculated in terms of school enrollment instead of number of schools.

f2 = a school-level non response adjustment factor calculated by class.

f3 = a post stratification adjustment factor calculated by grade.

Rae-Scott Chi-square tests were used to test for differences between boys and girls in smoking behavior and the other health risk and health protective behaviors included in the study. Logistic regression was used to examine the relationship of current smoking status (smoker vs. nonsmokers) as the dependent dichotomous variable with the predictor variables investigated in the study. The model examined relationship with the predictor variables of current smoking with categorical and dichotomous level predictor variables [e.g., how often have you felt lonely - most of the time or always (1) or (0) never, rarely, or sometimes].

### Results

Of the 8,108 subjects in the total sample, 3989 (49.2%) reported their gender as male and 4119 (50.8%) as female, with 23 not responding to the gender item. The sample was composed of 2581 students (32.0%) in grade 7<sup>o</sup> primary, 2694 students (33.4%) in grade 8<sup>o</sup> primary, and 2783 students (34.5%) in grade 1<sup>o</sup> secondary. With respect to age, 2596 students (32.0%) were 14 years of age, 2392 (29.5%) were 13, 1478 (18.2%) were 15, and 1166 (14.4%) were 12. Only 11 students (0.1%) were 11 years or younger, and only 464 students (5.7%) were 16 years or older. Table 1 presents current smoking prevalence for boys and girls in the total sample and in each region. Girls were significantly more likely than boys to be smokers in the total sample and also in the Metro Region, Region 5, and Region 8. The adjusted weighted prevalence of current smoking for the total sample was 25.5% for boys and 30.2% for girls. The highest prevalence of current smoking was found in the Metro Region. Table 1 also shows the percentages of students engaging in the other health risk and health protective behaviors included in the study by gender and identifies differences between boys and girls in these behaviors.

Current smoking by the various levels of the predictor variables and associated bivariate and multivariate relationships (odds ratios) are presented in Table 2. Odds ratios reported in the multivariate model reflect statistical control for all other variables in the model. In this model smoking risk was significantly associated with gender, grade level, region, parental tobacco use, parents checking homework, parents understanding problems and worries, parents being aware of free time, ever been drunk, ever used drugs, had sexual intercourse, being physically active, been in a physical fight, at risk of becoming overweight, eating fruits and vegetables,

missing classes or school, feeling sad/hopeless, feeling lonely, and worrying most of the time.

## Discussion

Research investigating the correlates of smoking among Chilean youth is important from the standpoint that smoking rates in Chile are reported to be the highest in Latin America<sup>22,23</sup> and among the highest in the world.<sup>1,2</sup> Also, little research has been reported on youth smokers in Chile. We found current smoking rates in the overall sample of 25.5% for boys and 30.2% for girls. These rates are lower than what has been reported previously in Global Youth Tobacco Survey (GYTS) data<sup>1,2</sup> but appear to be consistent with what has been reported by the Chile Ministry of Interior<sup>3,4</sup> at comparable grade levels. The GYTS reports current smoking for school-based youth ages 13-15 and those living in Santiago, Valparaiso, and Coquimbo. Unlike the GYTS, the Global School-based Student Health Survey (GSHS) sample comprised, in addition to 13-15 year olds, students under age 13 and over age 15 attending grades 7<sup>o</sup> primary, 8<sup>o</sup> primary, and 1<sup>o</sup> secondary. While the GSHS sample included Santiago, it also represented regions rather than cities like the GYTS. These differences in sampling may account for the lower smoking rate in the GSHS sample than that previously reported GYTS reports, and may reflect differences in urban-rural composition of the samples and age structures. Nevertheless, the fact that the smoking rates determined in this study, showing that approximately one-fourth (25.6%) of boys and almost one-third (30.2%) of girls are current smokers, identifies youth smoking rates that are too high and indicate the need for more intense smoking prevention efforts.

Gender was found to be an important characteristic that was significantly associated with current smoking in the Chilean youth. Girls were more likely to smoke than boys and the higher percent of girls smoking is consistent with Global Youth Tobacco Survey (GYTS) results in Chile which also showed a higher percent of girls smoking than boys among youth in Santiago.<sup>Error! Bookmark not defined.</sup> There is also evidence that smoking among girls in Chile is on the increase, while the reverse may be true for boys.<sup>Error! Bookmark not defined.</sup> The factors underlying these trends in smoking among Chilean girls need investigation. Studies in other adolescent populations suggest that smoking is often associated with adolescent girls' concerns about gaining weight and smoking is used as a means of controlling body weight.<sup>24</sup> Research by Scal, Ireland, and Borowsky<sup>25</sup>

and Clayton<sup>26</sup> has found that the factors leading to current smoking in girls differs from the factors influencing smoking initiation in boys. In general, this research found that girls are more susceptible to external influences so that being exposed to a higher prevalence of smoking at school or having friends who smoke influence girls to smoke more so than for boys.

Grade level is also strongly associated with smoking in the sample. The fact that current smoking increased from 17.0% in 7<sup>o</sup> primary grade to 27.8% in 8<sup>o</sup> primary, and further increased to 39.0% in 1<sup>o</sup> secondary grade is troubling. With nearly four in ten Chilean youth established as smokers by the first grade of secondary school, there is a clear need for early and intensive intervention in terms of smoking prevention programming and efforts earlier in the primary grades. The high prevalence of smoking during these grade levels further indicates the need for the availability of stop smoking programs and services. In fact, more than six in ten of the students who were smokers reported trying to stop smoking in the past 12 months.

Smoking was lowest among students in Region 1 (Región de Tarapacá). This region is located in the north below the Región de Antofagasta and borders Peru and Bolivia. Iquique, the regional capital, is located approximately 1840 kilometers to the north of Santiago, the nation's capital and largest city. Smoking was highest among students in the metro region of Santiago. Studies in North America<sup>27,28</sup> as well as studies in China and Scotland<sup>29</sup> comparing smoking rates of adolescents living in urban and rural areas show mixed results, with some showing higher rates among urban youth and others showing the opposite or no difference. It is likely that there are a multitude of economic, cultural, and environmental factors that need to be taken into account to further understand regional and urban-suburban-rural differences in smoking rates among Chilean youth.

This study also evaluated the association of smoking with variety of other important factors in the students' lives, including variables about parental tobacco use and parental involvement/monitoring, health risk and health protective behaviors, psychosocial feelings, and missing school. A multivariate logistic regression model indicated that the strongest predictors of smoking were the frequency of involvement in health-risk behaviors. Compared to nonsmokers, smokers were more likely to get drunk, use drugs, have sexual intercourse, and get into physical fights. They were also likely to miss school or classes without permission. This

pattern showing youth smoking and association with a constellation of risky or “deviant” behaviors is a finding that has often been found in adolescent populations in the United States as well.<sup>30</sup> In fact, Camenga, Klein, and Roy<sup>30</sup> found that the association between smoking and certain risky behaviors became stronger over a thirteen year time period (1991-2003). They found an increase in the association between smoking and binge drinking, lifetime number of sexual partners, sexual partners in the past three months, not wearing a seat belt, not wearing a bicycle helmet, and physical fighting, while the odds of engaging in other drug use remained stable or slightly decreased over the time period. Thus, they were able to determine that contemporary adolescent smokers in the U.S. were more likely to engage in certain risky behaviors than were adolescents in the early nineties. Their finding argues that in view of declining youth smoking rates in the U.S. coupled with stricter tobacco access laws, indoor smoking bans, and aggressive smoking counter-marketing efforts, that youth smoking appears to have become a more socially deviant behavior. While this is an interesting thesis, it must be realized that youth smoking behavior in Chile appears to be in a different “developmental stage” as smoking rates do not appear to be declining and smoking control efforts are not as intensive. Because of the connection of smoking with a constellation of high risk behaviors, it may be good advice for prevention planners and public health workers to follow Camenga, Klein, and Roy’s<sup>30</sup> recommendation for smoking prevention programs to also help to prevent youth from engaging in multiple risky behaviors in general and that smoking programs partner with efforts to reduce other substance use, violent behavior, and STD-HIV-related behaviors.

Because parental role modeling has been identified as a key factor in the smoking behavior of youth and parental smoking is a consistent predictor of youth smoking reported in the literature,<sup>31,32</sup> we expected the same to be true among this sample of Chilean youth. Our findings showed that parental/guardian tobacco use to be associated with youth smoking, with the highest risk of smoking among those reporting that both parents/guardians use tobacco. It is interesting that the risk of smoking was higher for students having a mother/female guardian who uses tobacco than for having a father/male guardian who uses tobacco. Beyond role modeling influence, the association of parental tobacco use on youth smoking behavior may also be a function of easier access to cigarettes, lower parental credibility when giving anti-smoking messages to their children, or other factors including genetic predisposition or

vulnerability. It is unfortunate that the GSHS questionnaire does not contain questions about smoking among peers, as peer influence is a strong determinant of smoking, and friends who smoke is often found to be the most important factor influencing smoking in most studies investigating determinants of youth smoking.<sup>33</sup> Therefore, the inclusion of peer smoking variables would have been a valuable addition to the current study.

Parental monitoring refers to parents' knowledge of their child's whereabouts, activities and companions. The relationship between parental monitoring and delinquent behaviors, including smoking, has rarely been studied in Hispanic populations of adolescents.<sup>34</sup> However, Biglan et al.<sup>35</sup> found among U.S. adolescents that when there was inadequate parental monitoring that youth were more likely to associate with deviant peers and more likely to smoke. Inadequate parental monitoring may also be an important factor in smoking among Chilean youth, given our finding that nonsmoking youth were more likely to report that their parents most of the time or always were aware of what they were doing in their free time. This finding suggests the need for interventions targeting parents to increase parental monitoring as a protective factor as part of smoking prevention efforts.

Being sad or having hopeless feelings almost every day for the past 12 months was found to be an independent predictor of youth smoking. Previous research has found depression to be a predictor of adolescent smoking initiation<sup>36,37</sup> and to perhaps be associated with nicotine dependence in adolescents.<sup>38</sup> The association of smoking with feelings of sadness and hopelessness is consistent with the self-medication hypothesis or stress-coping model, which posits that individuals use cigarette smoking as a means of coping with, alleviating, or regulating negative emotions (psychosocial distress).<sup>39</sup> Adolescent smokers commonly report that they smoke as a way to relax or manage distress/negative moods and stressful feelings.<sup>40</sup> While the self-medication hypothesis/stress-coping model appears to be a popular explanation surrounding the relationship between substance use and psychosocial distress, others suggest the possibility of a reverse causality, where smoking may increase the risk of feelings of distress.<sup>41</sup> The implication of this finding showing a relationship between sadness/hopelessness (depression) and smoking prevention is that smoking prevention efforts may be more successful if they address adolescent psychosocial distress indicators. Young people need to be taught better alternatives than smoking a cigarette for coping with depressive

feelings. Health professionals and health promotion programs should discuss with youth mental health and depression issues, and incorporate strategies that help youth to develop skills that foster positive coping and moods. Because adolescents who have significant psychosocial distress (e.g., feelings of sadness or hopelessness) are at greater risk for smoking, other substance use, and other behaviors that may endanger their health, educators and healthcare professionals should consider screening for depression and hopelessness. It is important not to miss opportunities to identify psychosocial distress, and to give referral to appropriate mental health providers when available.

In conclusion, it is important to point out an important deficiency identified in the Global Youth Tobacco Survey (GYTS) about smoking prevention education in Chilean schools. GYTS results showed that some of the lowest levels of teaching students about the dangers of smoking in class and also for discussing in class reasons why people their age smoke were reported by Chilean students.<sup>1</sup> For example, only 22.5% of students in Santiago said that they were taught the dangers of smoking in class and only 17.1% said that they discussed the reasons why people their age smoke. These levels were the lowest in Latin America and among the lowest of all of the countries where the survey was administered. Therefore, given the high rate of youth smoking among Chilean youth discussed in this paper and the need for Chilean schools to do more in terms of smoking prevention education, there is an important opportunity for health promotion and public health measures designed to curb youth smoking in Chile.

## Limitations

The current study was limited by the items that were included on the GSHS Chile questionnaire. While the questionnaire included a number of variables relevant to youth smoking, it did not include any items dealing with tobacco use by peers or friends, advertising influences, or a host of other variables known to be associated with smoking in other adolescent populations. Another limitation, of course, is that the items were based on self-reports of behavior and as a result the data is inherently subject to reporting errors/bias. Also, the measurement of variables such as sadness/hopelessness, loneliness, and anxiety was limited by the fact that measurement was based on single questionnaire items and not on standardized instruments measuring constructs such as depression, hopelessness, and anxiety. Further, the GSHS does not appear to have undergone any type of

reliability analysis or assessment in Chile or other countries in which data is available or reported. It should also be noted that the data reported here are cross-sectional in nature, making it impossible to determine the direction of influence between variables or to determine casual relationships. A final limitation is that the survey reported here was conducted in 2004 and it may not reflect changes in smoking behavior in more recent years.

Unfortunately data on smoking prevalence beyond 2004 among Chilean youth is not reported in the international literature. This data is important in determining the success of smoking prevention efforts in a country where youth smoking rates have been reported to be among the highest in the world and in Latin America. Certainly, youth smoking in Latin American countries needs to be the focus of future research.

## Acknowledge

The author would like to thank Camille Madsen who provided feedback and proofing on a draft of this manuscript.

## References

1. Global Youth Tobacco Survey Collaborative Group. Tobacco use among youth: a country comparison. *Tob Control*. 2002;11:252-270.
2. Warren CW, Jones NR, Peruga A, Chauvin J, et al. Global Youth Tobacco Surveillance, 2000-2007. *MMWR* 2008;57(SS01);1-21.
3. Consejo Nacional para el Control de Estupefacientes (CONACE). Ministerio del Interior. Gobierno de Chile. El consumo de cigarillos en Chile. Estudios de drogas en poblacion general de Chile 1994-2004. Estudios nacionales de drogas en poblacion escolar de Chile 1995-2003. Santiago, Chile: Ministerio de Interior; mayo 2005.
4. Araneda JC, Cumsille JF. Consumo de drogas en poblacion escolar de Chile en alumnus de 8° basico a 4° medio, 2003. *Revista Chilena de Salud Publica* 2004;2:63-71.
5. Ministerio del Interior, Espana, Delegacion del Gobierno para el Plan Nacional sobre Drogas, Observatorio Espanol sobre Drogas. Encuesta sobre drogas a poblacion escolar,

2002. Madrid, Espana: Ministerio del Interior;2003.
6. Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE. (2004). Monitoring the Future national results on adolescent drug use:overview of key findings, 2003. 2004;NIH Publication No. 04-5506. Bethesda, MD: National Institute on Drug Abuse.
7. Bonnefoy P. No smoking in Chile? No way. *Global Post*. 2009; October 13: Available online at <http://www.globalpost.com/print/3953741>
8. Sebrie EM, Glantz SA. Tobacco industry "youth smoking prevention" programs to undermine meaningful tobacco control in Latin America. *AJPH*. 2007; 97(8):1357-1367.
9. Caris L, Varas M, Anthony CB, Anthony JC. Behavioral problems and tobacco use among adolescents in Chile. *Pan Am J Public Health*. 2003;14(2):8490.
10. Valdivia G, Simonetti F, Cumsille P, Ramirez V, et al. Consumo de tabaco en poblacion menor de 18 anos: studio de prevalencia en escolares de Chile. *Rev Med Chile*. 2004;132:171-182.
11. Carvajal SC, Hanson C, Downing RA, Coyle KK, et al. Theory-based determinants of youth smoking: a multiple influence approach. *Journal of Applied Social Psychology*. 2006; 34(1):59-84.
12. Chassin L, Presson CC, Rose J, Sherman SJ, et al. Parenting style and smoking-specific parenting practices as predictors of adolescent smoking onset. *J Pediatr Psychol*. 2005; 30(4):333-344.
13. WHO. *Global school-based student health survey*. 2008. Available from <http://www.who.int/chp/gshs/en>. Accessed January 15, 2009.
14. World Health Organization. Global School-based Student Health Survey Chile (Metropolitan) 2004 Fact Sheet; no date. Available from [http://www.who.int/chp/gshs/gshs\\_fs\\_2004\\_chile\\_metropolitan.pdf](http://www.who.int/chp/gshs/gshs_fs_2004_chile_metropolitan.pdf). Accessed January 15, 2009.
15. World Health Organization. Global School-based Student Health Survey Chile (Region I) 2004 Fact Sheet; no date. Available from [http://www.who.int/chp/gshs/gshs\\_fs\\_2004\\_chile\\_metropolitan.pdf](http://www.who.int/chp/gshs/gshs_fs_2004_chile_metropolitan.pdf). Accessed January 15, 2009.
16. World Health Organization. Global School-based Student Health Survey Chile (Region V) 2004 Fact Sheet; no date. Available from [http://www.who.int/chp/gshs/gshs\\_fs\\_2004\\_chile\\_metropolitan.pdf](http://www.who.int/chp/gshs/gshs_fs_2004_chile_metropolitan.pdf). Accessed January 15, 2009.
17. World Health Organization. Global School-based Student Health Survey Chile (Region VIII) 2004 Fact Sheet;no date. Available from [http://www.who.int/chp/gshs/gshs\\_fs\\_2004\\_chile\\_metropolitan.pdf](http://www.who.int/chp/gshs/gshs_fs_2004_chile_metropolitan.pdf). Accessed January 15, 2009.
18. World Health Organization. Chile 2004 Global School-based Student Health Survey (GSHS);2004. Available from [http://www.who.int/chp/gshs/Chile\\_questionnaire\\_spanish\\_2004.pdf](http://www.who.int/chp/gshs/Chile_questionnaire_spanish_2004.pdf). Accessed January 15, 2009.
19. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ*. 2000;320:1240-1243.
20. Kolbe LJ, Kann L, Collins J. Overview of the Youth Risk Behavior Surveillance System. *Public Health Rep* 1993;108:2-10.
21. Rudatsikira E, Muula AS, Siziya S. Prevalence and associated factors of suicidal ideation among school-going adolescents in Guyana: Results from a cross sectional study. *Clin Pract Epidemol Ment Health*. 2007; 3(13): doi: 10.1186/1745-0179-3-13.
22. Bianco E, Champagne B, Barnoya J. The tobacco epidemic in Latin America and the Caribbean: a snapshot. *Prevention and Control*. 2006;1:311-317.

23. Muller F, Wehbe L. Smoking and smoking cessation in Latin America: a review of the current situation and available treatments. *International Journal of COPD*. 2008;3(2):285.
24. Honjo K, Siegel M. Perceived importance of being thin and smoking initiation among young girls. *Tob Control*. 2003;12:289-295.
25. Scal P, Ireland M, Borowsky IM. Smoking among American adolescents: a risk and protective factor analysis. *J Community Health*. 2003; 28(2):79-97.
26. Clayton S. Gender differences in psychosocial determinants of adolescent smoking. *J Sch Health*. 1991; 61:115-20.
27. Aloise-Young PA, Wayman JC, Edwards RW. Prevalence of cigarette smoking among rural adolescents in the United States. *Subst Use Misuse*. 2002, 37:613-30.
28. Plotnikoff RC, Bercovitz K, Loucaides CA. Physical activity, smoking, and obesity among Canadian school youth. Comparison between urban and rural schools. *Can J Public Health*. 2004, 95:413-8.
29. Lutfiyya MN, Shah KK, Johnson M, Bales RW, et al. Adolescent daily cigarette smoking: is rural residency a risk factor? *Rural and Remote Health*. 2008;8(875):1-12.
30. Camenga DR, Klein JD, Roy J. The changing risk profile of the American adolescent smoker: implications for prevention programs and tobacco interventions. *J Adolesc Health*. 2006;39:120.e1-120.e10.
31. Flay BR, Hu FB, Siddiqui O, Day LE, et al. Differential influence of parental smoking and friends' smoking on adolescent initiation and escalation of smoking. *J Health Soc Behav*. 1994;35,248-265.
32. Cohen, DA, Richardson, J, LaBree, L and alcohol use: a longitudinal study. *Pediatrics*. 1994;94,368-375.
33. Tyas SL, Pederson LL. Psychosocial factors related to adolescent smoking: a critical review of the literature. *Tobacco Control*. 1998;7:409-20.
34. Cota-Robles S, Gamble W. Parent-adolescent processes and reduced risk for delinquency: the effect of gender for Mexican American adolescents. *Youth & Society*. 2006;37(4):375-392.
35. Biglan A, Duncan TE, Ary DV, Smolkowski K. Peer and parental influences on adolescent tobacco use. *J Behav Med*. 1995;18(4):315-330.
36. Escobedo LG, Kirch DG, Anda RF. Depression and smoking initiation among U.S. Latinos. *Addiction*. 1996;91, 113-119.
37. Patton GC, Hibbert M, Rosier MJ, Carlin JB, et al. Is smoking associated with depression and anxiety in teenagers? *Am J Public Health*. 1996; 86(2), 225-230.
38. Kassel, J.D. Are adolescent smokers addicted to nicotine? The suitability of the nicotine dependence construct as applied to adolescents. In Wagner EF, ed., *Nicotine Addiction among Adolescents*. New York: Haworth Press; 2000:27-49.
39. Hussong, AM, Hicks RE. Affect and peer context interactively impact adolescent substance use. *J Abnorm Psychol*. 2003;31(4):413-426.
40. Turner L, Mermelstein R, Flay B. Individual and contextual influences on adolescent smoking. *Ann NY Acad Sci*. 2004;1021, 175-197.
41. Kassel JD, Stroud LR, Paronis CA. Smoking, stress, and negative affect: Correlation, causation and context across stages of smoking. *Psychol Bul*. 2003;129(2), 270-304.

**Table 1.** Adjusted<sup>a</sup> Weighted Percentages for Tobacco Use and Other Variables Included in the Study

	Boys % (95% Confidence Interval)	Girls % (95% Confidence Interval)	Chi Square <sup>b</sup> (df), <i>p</i> value
<i>Current Smokers (total sample)</i>	25.5 (23.6, 27.4)	30.2 (28.3, 32.1)	11.0 (1), <i>p</i> =.0009
<i>Current Smokers Region 1</i>	19.0 (16.4, 21.3)	22.7 (28.2 (19.9, 25.6)	3.25 (1), <i>p</i> =.0710
<i>Current Smokers Region 5</i>	23.6 (20.9, 26.3)	31.2 (28.2, 34.2)	13.3 (1), <i>p</i> =.0003
<i>Current Smokers Region 8</i>	25.1 (22.4, 27.9)	21.0 (18.3, 23.7)	4.27 (1), <i>p</i> =.0386
<i>Current Smokers Metro Region</i>	26.6 (23.7, 29.5)	32.9 (30.1, 35.7)	8.8 (1), <i>p</i> =.0030
<i>Parental Tobacco Use</i>			11.4 (1), <i>p</i> =.0224
Neither parent uses tobacco in any form	46.2 (44.1, 48.4)	41.5 (39.5, 43.5)	
Father or male guardian uses tobacco	16.7 (15.1, 18.3)	18.7 (17.1, 20.3)	
Mother or female guardian uses tobacco	13.7 (12.3, 15.2)	15.7 (14.3, 17.2)	
Both parents or guardians use tobacco	18.5 (16.8, 20.3)	18.8 (17.2, 20.4)	
Do not know	4.8 (3.9, 5.7)	5.2 (4.3, 6.2)	
<i>Smokers Who Tried to Stop in Past 12 Months</i>	62.4 (58.4, 66.4)	63.7 (60.3, 67.2)	8.3 (1), <i>p</i> =.0040
<i>Parents Check Homework</i>	46.5 (44.4, 48.7)	43.5 (41.5, 45.5)	4.0 (1), <i>p</i> =.0447
<i>Parents Understand Problems and Worries</i>	46.4 (44.2, 48.5)	47.1 (45.1, 49.1)	0.2 (1), <i>p</i> =.6439
<i>Parents are Aware of Free Time</i>	56.5 (54.3, 58.6)	58.8 (56.8, 60.8)	2.4 (1), <i>p</i> =.1179
<i>Have Ever Been Drunk</i>	25.9 (24.0, 27.7)	22.7 (21.0, 24.4)	5.9 (1), <i>p</i> =.0152
<i>Have Used Drugs</i>	11.2 (9.9, 12.6)	8.4 (7.2, 9.6)	9.4 (1), <i>p</i> =.0021
<i>Had Sexual Intercourse in the Past 12 Months</i>	13.2 (11.7, 14.8)	7.6 (6.5, 8.7)	34.7 (1), <i>p</i> <.0001
<i>Physically Active</i>	15.0 (13.4, 16.5)	7.0 (6.0, 8.1)	69.9 (1), <i>p</i> <.0001
<i>In a Physical Fight in the Past 12 Months</i>	52.2 (50.1, 54.4)	25.0 (23.2, 26.8)	332.8 (1), <i>p</i> <.0001
<i>At Risk for Becoming Overweight</i>	20.0 (17.9, 22.2)	14.9 (13.2, 26.8)	14.3 (1), <i>p</i> =.0002
<i>Ate Fruits and Vegetables</i>	22.9 (21.1, 24.7)	23.8 (22.0, 25.5)	0.4 (1), <i>p</i> =.4992

<i>Missed Classes or School without Permission</i>	24.7 (22.8, 26.6)	18.3 (16.7, 19.9)	34.7 (1), $p<.0001$
<i>Sad/Hopeless Almost Every Day during Past 12 Months</i>	22.0 (20.2, 27.8)	39.3 (37.3, 41.3)	152.4 (1), $p<.0001$
<i>Lonely Most of the Time or Always during Past 12 Months</i>	9.5 (8.2, 10.7)	22.8 (21.0, 24.5)	137.7 (1), $p<.0001$
<i>Worry Most of the Time or Always</i>	6.2 (5.1, 7.3)	11.9 (10.6, 13.3)	40.3 (1), $p<.0001$

---

**Table 2.** Sample Characteristics by Current Smoking and Bivariate and Multivariate Relationships between Predictors and Current Smoking<sup>a</sup>

Predictor	% (CI) of Current Smokers	<sup>b</sup> OR (95% CI) for Current Smoking, Bivariate	<sup>b</sup> OR (95% CI) for Current Smoking, Multivariate Model
<u>Gender</u>			
Male (reference)	25.5 (23.6, 27.5)	-	-
Female	30.3 (28.3, 32.2)	1.26 (1.25, 1.28)	1.81 (1.76, 1.84)
<u>Grade</u>			
7 <sup>o</sup> Primary grade (reference)	17.0 (14.7, 19.2)	-	-
8 <sup>o</sup> Primary grade	27.8 (25.5, 30.1)	1.88 (1.85, 1.91)	1.50 (1.45, 1.54)
1 <sup>o</sup> Secondary grade	39.0 (36.5, 41.5)	3.13 (3.08, 3.18)	2.41 (2.35, 2.48)
<u>Region</u>			
Region 1 (reference)	20.8 (18.9, 22.9)	-	-
Region 5	27.5 (25.4, 29.5)	1.44 (1.39, 1.48)	1.45 (1.37, 1.53)
Region 8	23.2 (21.3, 25.1)	1.15 (1.11, 1.19)	1.27 (1.20, 1.34)
Metro Region	29.9 (27.9, 32.0)	1.62 (1.57, 1.67)	1.33 (1.27, 1.40)
<u>Parental Tobacco Use</u>			
Neither (reference)	21.7 (19.8, 23.6)	-	-
Father/Male Guardian uses tobacco	27.3 (24.1, 30.4)	1.35 (1.33, 1.38)	1.16 (1.13, 1.20)
Mother/Female Guardian uses tobacco	33.9 (30.2, 37.6)	1.84 (1.81, 1.88)	1.45 (1.41, 1.49)
Both parents use tobacco	35.9 (32.4, 39.3)	2.02 (1.98, 2.05)	1.79 (1.74, 1.84)
Don't know	37.7 (30.8, 44.5)	2.18 (2.12, 2.24)	1.56 (1.49, 1.63)
<u>Parents Check Homework</u>			
Sometimes, rarely, or never (reference)	34.1 (32.1, 36.1)	-	-
Most of the time or always	20.1 (18.3, 21.9)	0.49 (0.48, 0.49)	0.89 (0.87, 0.91)
<u>Parents Understand Problems and Worries</u>			
Sometimes, rarely, or never (reference)	34.1 (32.1, 36.1)	-	-
Most of the time or always	21.1 (19.3, 22.9)	0.51 (0.50, 0.52)	0.95 (0.93, 0.97)
<u>Parents are Aware of Free Time</u>			
Sometimes, rarely, or never (reference)	39.1 (36.8, 41.4)	-	-
Most of the time or always	20.0 (18.4, 21.6)	0.39 (0.38, 0.40)	0.61 (0.59, 0.62)
<u>Have Ever Been Drunk</u>			
No (reference)	17.0 (15.6, 18.3)	-	-
Yes	62.8 (59.8, 65.8)	8.27 (8.15, 8.39)	4.15 (4.06, 4.25)
<u>Have Used Drugs</u>			
No (reference)	22.7 (21.4, 24.0)	-	-
Yes	77.3 (73.0, 81.5)	11.55 (11.29,	3.23 (3.12, 3.35)

Predictor	% (CI) of Current Smokers	<sup>b</sup> OR (95% CI) for Current Smoking, Bivariate	<sup>b</sup> OR (95% CI) for Current Smoking, Multivariate Model
		11.82)	
<u>Had Sexual Intercourse in Past 12 Months</u>			
No (reference)	23.4 (22.0, 24.8)	-	-
Yes	65.3 (60.4, 70.1)	6.14 (6.02, 6.27)	2.67 (2.58, 2.76)
<u>Physically Active</u>			
No (Reference)	28.2 (26.7, 29.7)	-	-
Yes	26.0 (22.0, 30.1)	0.89 (0.87, 0.91)	0.90 (0.87, 0.93)
<u>In a Physical Fight in Past 12 Months</u>			
No (reference)	22.0 (12.6, 14.7)	-	-
Yes	37.6 (13.2, 15.4)	2.14 (2.11, 2.17)	1.87 (1.83, 1.92)
<u>At risk for Becoming Overweight</u>			
No (reference)	28.4 (26.5, 30.2)	-	-
Yes	25.3 (21.5, 29.1)	0.86 (0.84, 0.87)	0.83 (0.80, 0.85)
<u>Ate Fruits and Vegetables</u>			
No (reference)	28.0 (24.8, 30.6)	-	-
Yes	27.7 (24.8, 30.6)	0.99 (0.97, 1.00)	0.87 (0.84, 0.89)
<u>Missed Classes or School without Permission</u>			
No (reference)	22.8 (21.5, 24.3)	-	-
Yes	47.3 (43.8, 50.7)	3.02 (2.98, 3.06)	2.08 (2.03, 2.13)
<u>Sad/Hopeless Almost Every Day during Past 12 Months</u>			
No (reference)	22.9 (21.4, 24.4)	-	-
Yes	39.8 (37.1, 42.6)	2.23 (2.20, 2.26)	1.41 (1.37, 1.44)
<u>Lonely Most of the Time or Always during Past 12 Months</u>			
No (reference)	25.5 (24.1, 26.9)	-	-
Yes	40.2 (36.4, 44.1)	1.97 (1.94, 2.00)	0.95 (0.93, 0.98)
<u>Worrying Most of the Time or Always during the Past 12 Months</u>			
No (reference)	26.7 (25.3, 28.1)	-	-
Yes	42.0 (36.8, 47.2)	1.99 (1.95, 2.03)	1.07 (1.03, 1.11)

a The percentages and odds ratios in this table are weighted statistics (see Methods section for description of weight). The multivariate logistic regression model included adjustment for all of the predictors included in this table.

b Abbreviations: OR=odds ratio; CI=confidence interval.