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Sensation seeking, risk behaviors and alcohol consumption among Mexican origin youth

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Abstract

Purpose—To examine factors associated with ever use of alcohol among Mexican origin youth.

Methods—Using a prospective study design, we followed 1053 Mexican origin adolescents. Participants completed two surveys in their homes and three follow-up telephone interviews, every six to eight months, in between. The second home survey was completed 30 months (SD=4.8 months) after baseline. Acculturation, subjective social status, and family cohesion were assessed at baseline and final home visit. Ever drinking, risk behaviors, and sensation seeking tendencies were assessed at the final home visit only.

Results—Overall, 30% of the study participants reported ever drinking alcohol. Multivariate models revealed that being female, increasing age, lower levels of acculturation, family cohesion and subjective social status, higher sensation seeking tendencies and concomitantly engaging in three or four other risk behaviors were associated with ever drinking. Also, social disinhibition, an aspect of sensation seeking, mediated the relationship between engaging in other risk behaviors and alcohol use. This is consistent with previous research, suggesting that social disinhibition is a common factor that underlies the use of alcohol, tobacco, illicit drugs, and other problem behaviors.

Conclusions—The results of this study support taking a family-based approach to prevention that includes discussion of other risk behaviors, especially smoking, among Mexican origin youth. In addition, tailoring programs by gender, directly addressing both how changes in social norms resulting from acculturation can impact a youth's decision to drink alcohol and underlying gender-based differences in why youth drink could improve the efficacy of preventive interventions.

Introduction

Hispanics may have distinct problems related to the development of alcohol-use disorders. Hispanics are more likely than African-Americans (AA) or non-Hispanic whites (NHW) to use alcohol at any age, and a recent study demonstrated that compared to AAs and NHWs, Hispanics are more likely to have alcohol-related problems [1]. Although the proportion of

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Hispanic adults who drink on a daily basis is smaller than that among AAs and NHWs, when Hispanics drink alcohol, they report consuming more alcohol per drinking day [2]. Other studies have confirmed this high risk for binge drinking among Hispanics [3]. This increased susceptibility to alcohol-related problems among Hispanics may result from impulsivity and sensation seeking [4]. Risk for alcohol-related problems would therefore depend on the combination of environmental and sociocultural factors predisposing to alcohol use, and individual characteristics interacting with these factors to determine likelihood of developing problematic alcohol use.

The social environment and cultural factors may interact with individual characteristics to influence risk. Acculturation may increase the risk of alcohol-related problems among Mexican Americans [MA; 5] and contribute to the strong causal relationship between alcohol and injury among Hispanics in the US [6]. Also, among younger Hispanics, parent-child communication [7], availability of alcohol in the home, parental use of and attitudes toward alcohol [8], and attitudes of peers [9] all increase the likelihood of alcohol use, although not necessarily alcohol use disorders.

Early use of alcohol correlates strongly with early use of other drugs, especially cigarettes [10]. Among junior high and high school Hispanic students as well as young adults [11] cigarettes are a possible gateway drug to alcohol use. This potential two-way association between the onset of the two deadliest drugs in our culture is a serious medical concern.

For these reasons, it is timely and warranted to study the associations between alcohol use and sensation seeking tendencies, acculturation, and the social environment among Mexican origin youth. We further examined whether social disinhibition, an aspect of sensation seeking, mediates the relationship between engaging in other risky health behaviors, including smoking, and alcohol use. Previous research has demonstrated that social disinhibition is a common factor or trait that underlies the use of alcohol, tobacco, illicit drugs, and other problem behaviors [12], underscoring the possibility that it may function as a mediator variable. We focused specifically on Mexican origin youth for two reasons. First, the term Hispanic [13] includes individuals from diverse ethnic backgrounds which are culturally distinct from each other. Most research to date has examined Hispanics as a group, and thereby may obscure specific risk factors associated with subgroups of Hispanics. Second, people of Mexican origin represent the largest and most rapidly growing subgroup of Hispanics in the US. In turn, Hispanics are the largest and most rapidly growing ethnic group in the US.

Methods

Our data were derived from Mexican origin adolescents who are participants enrolled in a prospective study of smoking behavior that began in 2005. Participants were drawn from a population-based cohort of Mexican-American households launched in 2001 by the Department of Epidemiology at The University of Texas M. D. Anderson Cancer Center. Households were initially recruited into the cohort via probability random-digit dialing, door-to-door recruitment, intercepts, and networking approaches. Results from these pooled recruitment methods indicated no significant differences in populations with respect to language preference, country of origin, years living in the US, and household income [14]. A detailed description of the cohort recruitment methodology has been published [15].

A total of 3,000 households with potential age-eligible (adolescents between the ages of 11 and 13 years) participants were identified from the cohort database. Of the first 1,425 potential participants' parents or legal guardians contacted to assess interest in the study, just over 90% agreed to enroll their child in the study (N=1,328). The institutional review board

at The University of Texas M. D. Anderson Cancer Center approved all aspects of this study.

Data collection

Data were collected via personal interview on five sequential encounters. At baseline and the final interview data were collected in the home, while on the second, third and fourth occasions data were collected over the telephone. The three follow-up telephone interviews, which assessed changes in smoking status, were conducted every six to eight months, and the final home visit was completed 30 months, on average, after baseline.

At baseline, after consenting to join the study, each participant completed a 5-minute personal interview during which basic demographic (gender, age, country of origin (US or Mexico)) and acculturation data were collected. To assure confidentiality from the parents overhearing any of the child's responses, the participant was given a personal digital assistant (PDA) to complete the remainder of the survey. The constructs assessed and measures used are described in detail in table 1. Participants answered the survey either in English or Spanish and received a \$25 gift card upon completion of the baseline and final home interviews. A detailed description of the baseline data collection procedures has been published [16].

Statistical analyses

We calculated the prevalence or mean and standard deviation of each predictor variable. We conducted Pearson's χ^2 tests to examine the associations between the categorical variables and ever drank alcohol and Student's t-tests to examine mean differences on the continuous variables by ever drank alcohol. We conducted four multivariable logistic regression analyses to examine the relations between the baseline predictor variables and ever drinking alcohol. In the first model we adjusted for gender, age, acculturation, subjective social status, and perceived family cohesion. In the second model we adjusted for the covariates in the first model and further adjusted for the risk behaviors (but not the sensation seeking subscales). In the third model we further adjusted for the sensation seeking subscales (but not the risk behaviors). In the final model all covariates were included. Odds ratios (OR) and 95% confidence intervals were estimated for each model. To adjust for SES, parental educational attainment was forced into all multivariable models. Variables were maintained in the multivariable models based on two criteria: 1) if it demonstrated a significant association with ever drank ($p < 0.05$) and 2) if inclusion resulted in a non-significant (defined as $p > 0.1$) Hosmer and Lemeshow goodness-of-fit statistic for the overall model [22].

In addition, to determine whether social disinhibition mediates the relationship between engaging in risk behaviors and ever drank alcohol we followed a methodology outlined by Baron and Kenny [23] and Kraemer et al. [24]. For this analysis ever drank alcohol was coded as yes or no; social disinhibition was coded as high or low based on the median split; and risk behaviors were divided into none or one versus two or more. The basic analytic approach employed multiple regression analyses [25] to determine whether the strength of the relationship between the risk behaviors and ever drank alcohol is significantly reduced after controlling for the relationship between social disinhibition and ever drinking. First ever drinking alcohol was regressed on risk behaviors; second the social disinhibition was regressed on risk behaviors; and third ever drank alcohol was regressed on social disinhibition and number of risk behaviors. In this analysis we controlled for gender, age, family cohesion, SSS and parental educational attainment. Because our outcome and mediator variables are dichotomous, we used logistic regressions in our analyses. In logistic

regression, a variable has a different scale when it is a predictor versus when it is a response variable. Therefore, the coefficients obtained from the logistic regression models were standardized before the Sobel test [26] was applied to determine whether social disinhibition carries the influence from the risk behaviors to the ever drinking. Hence we calculated the mediator effect using standardized coefficients.

Results

Of the 1,328 adolescents who were enrolled in the study at baseline, 1,154 (87%) provided data at all five data collection points and completed the final home visit. In addition, 33 participants, who withdrew during follow-up, were excluded from this analysis. Parental educational attainment data were not available for 31 of the 1,154 who completed final follow-up and data were missing from an additional 37 participants on the covariates. Thus the sample size for the current analysis was 1,053 youth. We observed no differences between the 1,053 participants included in the current analysis and the 275 participants who were enrolled at baseline but not included in the current analysis in terms of gender, age at baseline, country of birth, and smoking status at baseline ($p>0.10$ for all).

As summarized in table 2, the study included equal numbers of girls and boys, the mean age of the study participants at final follow-up was 14.4 year ($SD=1.0$ year), and the majority were born in the US (74.6%). In addition, 30% reported ever experimenting with alcohol, 28% reported ever experimenting with cigarettes, 29.2% reported wearing a bike helmet some or all of the time, 30% reported taking a dangerous dare some or all of the time in the previous 12 months, and 39% had been in detention during the previous 12 months. While there were no differences in ever drank alcohol by gender ($p=0.96$), country of birth ($p=0.51$), or parental educational attainment ($p=0.44$), we found that experience with alcohol increased with age ($p<0.001$). Although not achieving significance, participants who had drank alcohol were slightly more acculturated than their peers who had not ($p=0.08$). On average, participants who had consumed alcohol reported lower levels of subjective social status and family cohesion than their peers who had not ($p<0.001$ for both). A higher proportion of participants who reported having experimented with cigarettes, not always wearing a bike helmet, taking a dangerous dare in the previous 12 months, and being on detention in the previous 12 months reported ever drinking alcohol compared to their peers who responded negatively to these questions ($p<0.001$ all). Similarly, participants who reported ever drinking alcohol reported lower levels of social disinhibition, higher levels of thrill and adventure seeking, and more positive attitudes towards drugs and alcohol than those who had not ($p<0.001$ for all).

Table 3 presents the results from the hierarchical regression models for ever drank alcohol. Although gender was not significant in Model I, once the sensation seeking scales and/or the risk behaviors are included (Models II–IV), being a girl was associated with ever drinking alcohol. Regardless of the model, and not surprisingly, increasing age was associated with ever drinking alcohol. Reporting high levels of acculturation at baseline and follow-up was protective against ever drinking, as was an increase in SSS, but only when the sensation seeking scales were included in the model. Reporting either a decrease or low family cohesion at both times points was associated with increased risk for ever drinking alcohol, but not in the fully adjusted model. Higher levels of sensation seeking tendencies were associated with ever drinking alcohol, as was engaging in three or four other risk behaviors. Based on the AIC criteria we found Model IV to be the most parsimonious model. Because in model IV the impact of engaging in three or four other risk behaviors was attenuated by the inclusion of the sensation seeking scales, we examined the potential mediating effect of social disinhibition, one of the sensation seeking subscales, on the relationship between the other risk behaviors and ever drinking.

Figure 1 presents the results from the analysis examining the meditational effect of social disinhibition on the relationship between the risk behaviors and ever drinking, including the estimated standardized beta coefficients and their standard errors in parentheses for each path. The effect for risk behaviors on social disinhibition is 0.342 ($p < 0.001$). Engaging in two or more risk behaviors, compared to one or none, was associated with higher levels of social disinhibition. The effect for social disinhibition on ever drank drinking alcohol was 0.273 ($p < 0.001$). Higher levels of social disinhibition were associated with higher odds of ever drank alcohol. The unmediated relationship between risk behaviors and ever drank alcohol was 0.214 ($p < 0.001$). Engaging in two or more risk behaviors, compared to none or one, was associated with increased odds of ever drinking, in a dose-response manner.

The total reduction in the relationship between risk behaviors and ever drank alcohol due to social disinhibition was calculated as $\text{path}_a * \text{path}_b = 0.093$ ($0.342 * 0.273$). The mediator effect was a calculated as $(\text{path}_a * \text{path}_b) / (\text{path}_a * \text{path}_b + \text{path}_c)$, where c' is the effect of risk behaviors on ever drank, controlling for social disinhibition. Hence the mediator effect was 23% ($0.093 / 0.093 + 0.307$). The Sobel test statistic = 5.33 ($p < 0.0001$), which further suggests that social disinhibition mediates the relationship between the risk behaviors and ever drank alcohol. However the mediation was not perfect. Including social disinhibition did not eliminate the relationship; it significantly reduced the strength of the association, demonstrating partial mediation.

Discussion

In this study we examined the associations between alcohol use and both sensation seeking tendencies and specific risk behaviors among Mexican origin youth. We examined four models and focus our discussion on model IV because it was the most parsimonious model. After controlling for gender, age, acculturation, SSS and family cohesion, we found that as sensation seeking tendencies increased and the number of concomitant risk behaviors increased so did the odds of ever drinking alcohol. Including the risk behaviors in model IV did not significantly attenuate the relationship between the sensation seeking subscales and ever drinking alcohol. Participants who reported engaging in three or four other risk behaviors were almost five times more likely to have consumed alcohol than their peers who did not report engaging in other risk behaviors. Therefore we find that among Mexican origin youth, consistent with the results from many studies based on youth of all ethnicities, higher levels of sensation seeking tendencies are associated with adolescent drinking [27,28] and adolescent risk behaviors tend to cluster [12,29].

We further found that social disinhibition, an aspect of sensation seeking, mediates the relationship between engaging in other risk behaviors, including smoking, and alcohol use. Our finding is consistent with previous research demonstrating that social disinhibition is a common factor or trait that underlies the use of alcohol, tobacco, illicit drugs, and other problem behaviors [12]. Among the other risk behaviors we examined, the strongest correlation was between ever drinking and ever smoking ($r=0.38$; $p<0.001$), which has implications for the development of primary prevention programs. Others have reported similar findings [30], underscoring the need to better understand the role of factors such as social disinhibition which underlie both behaviors.

The prevalence rate of ever drinking we observed (30.4%) is similar to previously published rates for youth of all ethnicities in the US of comparable age [31] and to rates among Mexican adolescents 12 to 22 years of age [32]. In addition, the current drinking rate we observed of 14.3% is similar to the 13.1% reported for 14–15 year old youth of all ethnicities in the US [33]. Given that teens who begin drinking before age 15 are five times more likely to develop alcohol dependence than those who begin drinking at age 21 [34],

and the average of participants in our study was 14.4 years, the rate of ever drinking we observed underscores the continued need to develop effective primary prevention programs that focus on younger adolescents.

Consistent with results from Monitoring the Future study [35], which is based on a representative national sample of adolescents aged 12 to 18, and another national sample of Hispanic youth [36] we find that the prevalence rates for ever drinking are similar for both genders. Although the prevalence rate of ever drinking alcohol was the same for males and females in our study, in the final multivariable model, girls were two times more likely to be ever drinkers than boys. This discrepancy could be attributed to gender differences in why youth drink. In reviewing why youth drink, Kuntsche et al [37] concluded that boys, and in particular sensation-seeking boys, drink to improve their positive emotional state, while girls, and in particular anxious girls, are more likely to drink to cope with a negative emotional state. In addition, among MA college students, acculturative stress is related to ever drinking among women but not men [38]. Therefore in contrast to the current analysis, previous studies examining multiple risk factors for ever alcohol use that report no gender differences may not have included measures of sensation seeking. It is only in the models in which we include sensation seeking that the odds of ever drinking for girls is double that for boys.

The observed gender difference could also be related to the acculturation process, as several studies suggest that the impact of acculturation among Mexican origin youth is different for girls and boys [38,39]. In the final multivariable model, we found that lower levels of acculturation were associated with increased odds of ever drinking alcohol. This finding is inconsistent with previous studies of Mexican origin youth [40], MA college students [38] as well as Latino adolescents in general [39,40]. In traditional Mexican families, boys are granted more freedom than girls; drinking and smoking are both culturally acceptable for males but not females. Therefore as families acculturate girls may be granted equal freedom, which could result in more opportunities to drink alcohol and fewer parental sanctions against such behavior.

Few studies to date have examined the relationship between SSS and drinking alcohol among adolescents. In a study based in Mexico among low SES adolescents that used a similar approach to assessing SSS, compared to non-drinkers, current drinkers reported lower SSS scores relative to others in society, but higher SSS scores relative to others in their community [32]. In our study we examined SSS using the school as the referent population and found that an increase in SSS from baseline to follow-up was protective. Some of the reasons why youth drink [37], such as to overcome anxiety or to be cool, are potentially related to SSS. We are concurrently assessing drinking behavior, motivation to drink and perceived benefits from drinking which will enable us to more thoroughly examine the role SSS may play in the onset of drinking alcohol.

We found that youth who reported either consistently low levels of family cohesion or a decrease in family cohesion were more likely to report ever drinking alcohol than youth who reported consistently higher levels of family cohesion. The protective benefit of family cohesion we observed is consistent with results from other studies among Latino youth. In one study, youth who reported positive family relations were less likely to report ever drinking than youth who reported poor family relations [39] and in another youth who reported more frequent communication with their parents were less likely to report ever drinking alcohol than youth who reported less frequent communication [7]. Taken as a whole, these results suggest that one way to prevent youth drinking is to improve the quality of the relationship and increase communication between adolescents and their parents.

The current study has both strengths and limitations. The participants were from a population-based cohort and included roughly equal numbers of girls and boys. In addition, all covariates were assessed using validated measures, and the data were collected in the participants' homes using PDAs, which enabled the participants to read the questions themselves and answer without their parents hearing or viewing their responses, thereby ensuring their privacy. The high retention rate is another strength – 87% of the youth provided data in this study on all five contacts. A final strength of the study is the participants, who represent a large ethnically homogenous and predominantly low-income sample of Mexican origin youth, an understudied population. The households in the population-based cohort from which our participants are drawn are representative of the Mexican origin population in Houston [14].

Conversely, a limitation of this study stems from the fact the participants were all of Mexican origin, and therefore the results may not generalize to youth from other ethnic backgrounds, including Hispanics from different countries of origin. In addition, we did not examine several established risk factors for alcohol use, such as peer and parental norms and use of alcohol [27] as we did not assess these risk factors in our study. Although previous research suggests that higher parental educational attainment may increase the likelihood of alcohol use among MA adolescents [35], 65% of the participants' parents included in our study did not complete high school, which precluded examining this risk factor. Because all risk behaviors and social disinhibition were assessed contemporaneously it is difficult to establish directionality of the variables in the mediational model and thereby establish causality. Finally, although it is the onset of binge drinking (for males consuming at least five drinks and for females consuming at least four drinks in less than two hours) which predicts habitual alcohol use and dependence that is a concern among Hispanics, the focus of the current analysis is on ever drinking. This is because the onset of any alcohol use precedes binge drinking; our participants are young (mean=14.4 years and SD=1 year) and early onset of ever drinking predicts binge drinking.

In conclusion, our results confirm previous research and expand our understanding of alcohol use among Mexican origin youth, with implications for the development of primary prevention programs. Our results suggest that taking a family-based approach to prevention that includes discussion of other risk behaviors, especially smoking, could have benefits for Mexican origin youth. In addition, tailoring programs by gender, directly addressing both how changes in social norms resulting from acculturation can impact a youth decision to drink alcohol and underlying gender-based differences in why youth drink could improve the efficacy of preventive interventions.

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References

1. Schmidt LA, Ye Y, Greenfield TK, et al. Ethnic disparities in clinical severity and services for alcohol problems: results from the National Alcohol Survey. *Alcohol Clin Exp Res*. 2007; 31:48–56. [PubMed: 17207101]
2. Dawson DA. Beyond black, white and Hispanic: race, ethnic origin and drinking patterns in the United States. *J Subst Abuse*. 1998; 10:321–339. [PubMed: 10897287]

3. Caetano R, Raspberry K. Drinking and DSM-IV alcohol and drug dependence among white and Mexican-American DUI offenders. *J Stud Alcohol*. 2000; 61:420–426. [PubMed: 10807213]
4. Maddahian E, Newcomb MD, Bentler PM. Adolescent drug use and intention to use drugs: concurrent and longitudinal analyses of four ethnic groups. *Addict Behav*. 1988; 13:191–195. [PubMed: 3369329]
5. Guilamo-Ramos V, Jaccard J, Johansson M, et al. Binge drinking among Latino youth: role of acculturation-related variables. *Psychol Addict Behav*. 2004; 18:135–142. [PubMed: 15238055]
6. Cherpitel CJ, Borges G. Drinking in the injury event: a comparison of Mexican-American male ER patients in the United States and in Mexico. *Subst Use Misuse*. 2002; 37:133–143. [PubMed: 11848157]
7. Elder JP, Campbell NR, Litrownik AJ, et al. Predictors of cigarette and alcohol susceptibility and use among Hispanic migrant adolescents. *Prev Med*. 2000; 31:115–123. [PubMed: 10938211]
8. Breslau J, Guilar-Gaxiola S, Kendler KS, et al. Specifying race-ethnic differences in risk for psychiatric disorder in a USA national sample. *Psychol Med*. 2006; 36:57–68. [PubMed: 16202191]
9. Epstein JA, Botvin GJ, Baker E, Diaz T. Impact of social influences and problem behavior on alcohol use among inner-city Hispanic and black adolescents. *J Stud Alcohol*. 1999; 60:595–604. [PubMed: 10487728]
10. Westermeyer J, Canive J, Garrard J, et al. Lifetime prevalence of pathological gambling among american Indian and Hispanic American Veterans. *Am J Public Health*. 2005; 95:860–866. [PubMed: 15855466]
11. Parra-Medina DM, Talavera G, Elder JP, et al. Role of cigarette smoking as a gateway drug to alcohol use in Hispanic junior high school students. *J Natl Cancer Inst Monogr*. 1995:83–86. [PubMed: 8562226]
12. McGue M, Iacono WG, Krueger R. The association of early adolescent problem behavior and adult psychopathology: A multivariate behavioral genetic perspective. *Behav Genetics*. 2006; 36:591–602.
13. United States Census Bureau. Census 2000 Summary File 1 (SF 1) 100-Percent Data. United States Census Bureau; 2000. P12H. Sex by age (Hispanic or Latino) People who are Hispanic or Latino.
14. Saunders, KM. Unpublished Master's Thesis. 2005. Evaluation of recruitment strategies for obtaining a representative cohort of urban Mexican Americans.
15. Wilkinson AV, Spitz MR, Strom SS, et al. Effects of nativity, age at migration, and acculturation on smoking among adult Houston residents of Mexican descent. *Am J Public Health*. 2005; 95:1043–1049. [PubMed: 15914831]
16. Wilkinson AV, Waters AJ, Vasudevan V, et al. Correlates of smoking susceptibility among Mexican origin youth. *BMC Public Health*. 2008; 8:337. [PubMed: 18822130]
17. Centers for Disease Control and Prevention. Youth Risk Behavioral Surveillance Survey: 2001 Information and Results. <http://www.cdc.gov/nccdphp/dash/yrbs/youth01online.htm>
18. Norris AE, Ford K, Bova CA. Psychometrics of a brief acculturation scale for Hispanics in a probability sample of urban Hispanic adolescents and young adults. *Hisp J Beh Sci*. 1996; 18:29–38.
19. Goodman E, Adler NE, Kawachi I, et al. Adolescents' perceptions of social status: development and evaluation of a new indicator. *Pediatrics*. 2001; 108:E31. [PubMed: 11483841]
20. Foxcroft D, Lowe G. Adolescent drinking, smoking and other substance use involvement: links with perceived family life. *J Adolesc*. 1995; 18:159–177.
21. Russo MF, Stokes GS, Lahey BB, et al. A sensation seeking scale for children: Further refinement and psychometric development. *J Psychopath Behav Assess*. 1993; 15:69–86.
22. Hosmer, DW.; Lemeshow, S. *Applied Logistic Regression*. New York: Wiley; 1989.
23. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol*. 1986; 51:1173–82. [PubMed: 3806354]
24. Kraemer HC, Stice E, Kazdin A, et al. How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. *Am J Psychiatry*. 2001; 158:848–56. [PubMed: 11384888]

25. Kenny, DA.; Kashy, DA.; Bolger, N. Data analysis in social psychology. In: Gilbert, D.; Fiske, S.; Lindzey, G., editors. The handbook of social psychology. 4. Vol. 1. Boston, MA: McGraw-Hill; 1998. p. 233-265.
26. Sobel, ME. Asymptotic intervals for indirect effects in structural equations models. In: Leinhardt, S., editor. Sociological methodology 1982. San Francisco: Jossey-Bass; 1982. p. 290-312.
27. Donohew RL, Hoyle RH, Clayton RR, et al. Sensations seeking and drug use by adolescents and their friends: models for marijuana and alcohol. *J Stud Alcohol*. 1999; 60:622–631. [PubMed: 10487731]
28. Henry KL, Slater MD, Oetting ER. Alcohol use in early adolescence: the effect of changes in risk taking, perceived harm and friends' alcohol use. *J Stud Alcohol*. 2005; 66:275–83. [PubMed: 15957679]
29. Sullivan CJ, Childs KK, O'Connell D. Adolescent risk behavior subgroups: an empirical analysis. *J Youth Adolescence*. 2009 Epub ahead of print.
30. Shetty K, Brown J. Oral cancer risk factors among Mexican American Hispanic adolescents in South Texas. *J Dent Child (Chic)*. 2009; 76:142–148. [PubMed: 19619428]
31. Department of Health and Human Services. The Surgeon General's Call to Action To Prevent and Reduce Underage Drinking. Department of Health and Human Services, Office of the Surgeon General; 2007.
32. Ritterman RM, Fernald LC, Ozer EJ, Adler NE, Gutierrez JP, Syme SL. Objective and subjective social class gradients for substance use among Mexican adolescents. *Soc Sci Med*. 2009; 68:1843–1851. [PubMed: 19342140]
33. Substance Abuse and Mental Health Services Administration. Office of Applied Studies, NSDUH Series H-36, DHHS Publication No. SMA 09-4434. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2009. Results from the 2008 National Survey on Drug Use and Health: National Findings.
34. Substance Abuse and Mental Health Services Administration. Office of Applied Studies, NSDUH Series H-25, DHHS Publication No. SMA 04-3964. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2004. The NSDUH Report: Alcohol Dependence or Abuse and Age At First Use.
35. Delva J, Wallace JM Jr, O'Malley PM, et al. The epidemiology of alcohol, marijuana, and cocaine use among Mexican American, Puerto Rican, Cuban American, and other Latin American eighth-grade students in the United States: 1991–2002. *Am J Public Health*. 2005; 95:696–702. [PubMed: 15798132]
36. Nielsen AL, Ford JA. Drinking patterns among Hispanic adolescents: results from a National Household Survey. *J Stud Alcohol*. 2001; 62:448–56. [PubMed: 11513223]
37. Kuntsche E, Knibbe R, Gmel G, et al. Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. *Addict Behav*. 2006; 31:1844–1857. [PubMed: 16460883]
38. Raffaelli M, Torres Stone RA, Iturbide MI, et al. Acculturation, gender, and alcohol use among Mexican American college students. *Addict Behav*. 2007; 32:2187–99. [PubMed: 17408871]
39. Wahl AG, Eitle TM. Gender, acculturation and alcohol use among Latina/o adolescents: a multi-ethnic comparison. *J Immigrant Minority Health*. 2008 Epub ahead of print.
40. Epstein JA, Botvin GJ, Diaz T. Linguistic acculturation associated with higher marijuana and polydrug use among Hispanic adolescents. *Subst Use Misuse*. 2001; 36:477–99. [PubMed: 11346278]

Figure 1.
Mediation of risk behaviors on ever drank alcohol by social disinhibition

Table 1

Constructs assessed, description of measures, and data collection schedule

Construct	Description	Collection
Ever drank alcohol [17]	Assessed by: "During your life, on how many days have you had at least one drink of alcohol?" Responses of 0 days were coded as "never," all other responses were coded as "ever."	Final follow-up only
Demographic variables	Female served as the reference category for gender. Born in Mexico served as the reference category for country of birth. Age was entered as a continuous variable. Household socio-economic status (SES) was assessed using parental educational attainment rather than household income, because more than 40% of the parents did not report their income, while the majority reported educational attainment. SES was divided into two categories: "less than high school" and "high school/General Educational Development equivalency or more than high school."	Baseline only
Linguistic acculturation [18]	Four items ascertain language used when reading, speaking at home, speaking with friends, and thinking. Responses are made on a five-point scale ranging from "only Spanish" to "only English." Based on our data, the scale has excellent internal reliability ($\alpha=0.92$). Dichotomized the measure (low and high) at both time points to create a four-level classification variable that represents change in acculturation from baseline to final home visit. Categories included a) low-low (reference category); b) high-low; c) low-high; and d) high-high.	Baseline and final home visit
Subjective social status [19]	Participants are asked "At the top of the ladder are kids who are best off – get good grades, have lots of friends, or do well at sports. At the bottom are kids who are worst off – get poor grades, have few friends or do poorly in sports. Choose the <u>one</u> rung where you think you are on the ladder." Dichotomized SSS (low and high) at both time points to create a four-level classification variable that represents change in SSS from baseline to final home visit. Categories included a) low-low (reference category); b) high-low; c) low-high; and d) high-high.	Baseline and final home visit
Family cohesion	Assessed using 7 items from the Family Life Questionnaire [20]. These items assess perceptions of the family environment. Responses are made on a four-point scale ranging from "strongly disagree" to "strongly agree." Based on our data, the scale has good internal reliability ($\alpha=0.77$). Dichotomized family cohesion (low and high) at both time points to create a four-level classification variable that represents change in family cohesion from baseline to final home visit. Categories included a) high-high (reference category); b) high-low; c) low-high; and d) low-low.	Baseline and final home visit
Risky behaviors [17]	Smoking behavior was assessed by: "Have you ever smoked a whole cigarette?" and "Have you ever tried a cigarette, even a puff?" A response of "yes" to either item was coded as "1" and a response of "no" to both was coded as "0." Bike helmet use was assessed by: "When you rode a bicycle during the past 12 months, how often did you wear a helmet?" Some or all of the time were coded as "0," while all other responses were coded as "1." Dare taking was assessed by: "During the past 12 months, how many times have you taken a dangerous dare?" Responses of never were coded as "0" all others were coded as "1." Detentions were assessed by: "During the past 12 months, how many times have you been on detention?" Responses of never were coded as "0" all others were coded as "1." Responses to the 4 items were summed to create the risk behaviors index.	Final follow-up only
Sensation seeking tendencies [21]	The scale consists of 26 items each and comprises three subscales each with good internal reliabilities: thrill and adventure seeking (TAS; $\alpha=0.81$), drug and alcohol attitudes (DAA; $\alpha=0.72$) and social disinhibition ($\alpha=0.68$). Participants endorse the choice that most describes what they like or feel. E.g. "a) I'd never do anything that's dangerous" or "b) Sometimes I like to do things that are a little scary" is taken from the TAS scale; "a) I would like to try marijuana" or "b) I would never smoke marijuana" is taken from the DAA scale; and "a) I don't like being around kids who act wild and crazy" or "b) I enjoy being around kids who sometimes act wild and crazy" is taken from the social disinhibition scale.	Final follow-up only

Table 2

Descriptive characteristics of study participants (N = 1,053)

	N (%)	Mean (SD)	Drank Alcohol		p-value
			Yes	No	
Overall	1,053 (100.0)	--	320 (30.4)	733 (69.6)	
Gender					
Females	531 (50.4)	--	161 (30.5)	370 (69.5)	
Males	522 (49.6)	--	159 (30.3)	363 (69.7)	0.961
Age (years)					
Twelve	12 (1.1)	--	0 (0.0)	12 (100.0)	
Thirteen	228 (21.7)	--	36 (15.8)	192 (84.2)	
Fourteen	343 (32.6)	--	90 (26.2)	253 (73.8)	
Fifteen	319 (30.3)	--	124 (38.9)	195 (61.1)	
Sixteen	139 (13.2)	--	64 (46.0)	75 (54.0)	
Seventeen	12 (1.1)	--	6 (50.0)	6 (50.0)	
Mean	--	14.4 (1.0)	14.7 (1.0)	14.2 (1.0)	< 0.001
Country of birth					
US	786 (74.6)	--	240 (30.5)	546 (69.5)	
Mexico	267 (25.4)	--	80 (30.0)	187 (70.0)	0.861
Acculturation Scale					
Mean	--	3.5 (0.9)	3.6 (0.8)	3.5 (0.9)	0.082
Range	--	1–5			
Subjective social status					
Mean	--	8.2 (1.7)	7.8 (1.6)	8.3 (1.7)	< 0.001
Range	--	1–10			
Parental education					
< HS	687 (65.2)	--	201 (29.3)	486 (70.7)	
HS Grad	178 (16.9)	--	55 (30.9)	123 (69.1)	
> HS	188 (17.9)	--	64 (34.0)	124 (66.0)	0.444
Family cohesion					
Mean	--	2.9 (0.4)	2.8 (0.4)	3.0 (0.4)	< 0.001
Range	--	1–4			

	N (%)	Mean (SD)	Drank Alcohol		p-value
			Yes	No	
Risk Behaviors					
Ever drank alcohol					
Yes	320 (30.4)	--	--	--	
No	733 (69.6)	--	--	--	
Ever experimented with cigarettes					
Yes	290 (27.5)	--	170 (58.6)	120 (41.4)	
No	763 (72.5)	--	150 (19.7)	613 (80.3)	< 0.001
Wore bike helmet					
No	746 (70.8)	--	266 (35.7)	480 (64.3)	
Yes	307 (29.2)	--	54 (17.6)	253 (82.4)	< 0.001
Took dangerous dare last 12 months					
Yes	320 (30.4)	--	154 (48.1)	166 (51.9)	
No	733 (69.6)	--	166 (22.6)	567 (77.4)	< 0.001
Had detention					
Yes	406 (38.6)		166 (40.9)	240 (59.1)	
No	647 (61.4)		154 (23.8)	493 (67.3)	< 0.001
Sensation seeking subscales					
Social disinhibition	--	3.3 (1.9)	4.5 (1.6)	2.8 (1.8)	< 0.001
Range	--	0-7			
Thrill & adventure seeking	--	6.9 (3.3)	8.1 (2.9)	6.3 (3.3)	< 0.001
Range	--	0-12			
Drug & alcohol attitudes	--	1.2 (1.6)	2.2 (2.0)	0.7 (1.1)	< 0.001
Range	--	0-7			

Table 3
Hierarchical logistic regression for ever alcohol with sensations seeking scale and risky behaviors (N=1,053)

	Model I			Model II			Model III			Model IV		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Male	0.88	0.66–1.61	0.362	0.54	0.40–0.75	<0.001	0.48	0.34–0.68	<0.001	0.41	0.29–0.59	<0.001
Age	1.67	1.45–1.92	<0.001	1.57	1.35–1.83	<0.001	1.48	1.26–1.74	<0.001	1.45	1.23–1.71	<0.001
Acculturation (low-low)												
high-low	1.21	0.79–1.86	0.377	1.16	0.73–1.84	0.533	0.79	0.48–1.28	0.335	0.85	0.51–1.40	0.511
low-high	1.30	0.79–2.14	0.302	1.11	0.65–1.91	0.694	0.82	0.47–1.45	0.502	0.81	0.45–1.44	0.474
high-high	1.12	0.80–1.58	0.515	0.95	0.66–1.38	0.802	0.66	0.44–0.99	0.042	0.66	0.44–0.99	0.047
Subjective social status (low-low)												
high-low	0.67	0.46–0.99	0.049	0.82	0.53–1.25	0.353	0.74	0.47–1.18	0.206	0.82	0.51–1.31	0.407
low-high	0.79	0.51–1.23	0.299	0.77	0.48–1.24	0.281	0.52	0.31–0.87	0.012	0.54	0.32–0.91	0.021
high-high	0.70	0.42–0.19	0.186	0.70	0.40–1.23	0.221	0.74	0.41–1.35	0.326	0.74	0.40–1.37	0.333
Family cohesion (high-high)												
high-low	2.60	1.77–3.80	0.000	1.86	1.23–2.80	0.003	1.55	1.01–2.40	0.047	1.38	0.88–2.15	0.160
low-high	1.25	0.78–2.00	0.348	1.08	0.65–1.78	0.772	1.20	0.71–2.01	0.502	1.10	0.65–1.88	0.716
low-low	2.08	1.45–2.99	0.000	1.46	0.99–2.16	0.054	1.34	0.89–2.02	0.163	1.16	0.76–1.77	0.493
Sensation seeking subscales												
Thrill & adventure seeking	--	--	--	--	--	--	1.10	1.04–1.17	0.002	1.07	1.01–1.14	0.037
Drug & alcohol attitudes	--	--	--	--	--	--	1.51	1.35–1.70	<0.001	1.45	1.29–1.63	<0.001
Social disinhibition	--	--	--	--	--	--	1.43	1.28–1.60	<0.001	1.32	1.18–1.49	<0.001
Risk behaviors												
One	--	--	--	4.28	1.89–9.68	<0.001	--	--	--	3.33	1.42–7.79	0.006
Two	--	--	--	9.90	4.40–22.28	<0.001	--	--	--	5.06	2.15–11.92	<0.001
Three or four	--	--	--	28.42	12.40–65.14	<0.001	--	--	--	9.27	3.82–22.48	<0.001
AIC Criteria		1203.87			1063.93			986.39			951.39	

NB: All models adjusted for SES