

Is Image Everything? The Role of Self-Image in the Relationship between Family Functioning and Substance Use among Hispanic Adolescents

Michele Mouttapa, Ph.D., Jie Wu Weiss, Ph.D., and Mary Hermann, M.P.H.

California State University, Fullerton

This research was partially supported by the California Tobacco Related Disease Research Program (TRDRP Grant # 9DT-0090) awarded to the second author. Please address all correspondence to Michele Mouttapa, Ph.D., Department of Health Science, California State University, Fullerton, 800 N. State College Blvd., Fullerton, CA 92834, USA. Phone (714) 278-8436, email: mmouttapa@fullerton.edu

Abstract

This cross-sectional self-report study examined whether: (1) family functioning (Family Functioning in Adolescence Questionnaire) and self-image (Piers-Harris Children's Self-Concept Scale) have independent associations with smoking and alcohol use, and (2) self-image mediates the relationship between family functioning, smoking and alcohol use among 1,598 Hispanic 7-12th grade males and females in Los Angeles County, California in 2001. The findings supported the main effects and, to some degree, the mediational effects that were hypothesized. Limitations and implications for this study are discussed, and directions for future research are suggested. This study was funded by the California Tobacco Related Disease Research Program.

Keywords: Hispanic adolescents, alcohol use, smoking, family functioning, self-image

Introduction

Adolescence marks the beginning of a heightened awareness and preoccupation with one's self-image, and a time of experimentation with a variety of adult roles independent of their parent (Burton et al, 1989; Campbell, 2006; McCool, Cameron, & Petrie, 2001). For some adolescents, this involves experimentation with substances such as alcohol and cigarettes. Compared to adolescents of other ethnic groups, substance use rates among Hispanic adolescents have remained high (Centers for Disease Control and Prevention, 2005; Delva et al., 2005). Several studies suggest that adolescents' self-image and indicators of family functioning are associated with substance use, and that these associations vary across ethnic groups (McGrady, 2006; Nowlin & Colder, 2007; Nyamathi et al., 2001; O'Byrne, Haddock, & Poston, 2002; Unger et al., 2001; Weiss et al., 2005). Therefore, it is particularly important to examine the role of such factors within the Hispanic adolescent population, as Hispanics

represent the largest and fastest growing minority population in the U.S. (U.S. Census Bureau, 2004). In an adolescent population, it is particularly important to examine cigarette smoking and alcohol use, as these substances are considered "gateway drugs", that is, substances that lead to use of illicit substances such as cocaine, heroin, methamphetamine, and ecstasy (Kandel, 2002).

Substance use among Hispanic adolescents

Cigarette smoking and alcohol use is prevalent among Hispanic adolescents. According to the Centers for Disease Control and Prevention (CDC, 2005), over one in five Hispanic 9th-12th graders (22%) have used cigarettes at least once in the past 30 days and nearly one half (46.8%) have used alcohol in the past 30 days. Studies utilizing current nationwide datasets suggest that Hispanic adolescents have similar rates of smoking relative to Caucasian adolescents, and higher rates than those of African American adolescents (CDC, 2005; Grucza & Bierut, 2006; Kandel et al., 2004). Although Hispanic

adolescents consume alcohol at similar or lower rates than their Caucasian counterparts (CDC, 2005; Griffin et al., 2004; Grucza & Bierut, 2006), Hispanic adolescents report the fewest factors associated with lower rates of substance use (protective factors) such as high grades in school, having few friends who do not drink alcohol, and negative expectancies (undesired consequences that are anticipated) for drinking alcohol.

Family functioning and substance use

Close family ties and loyalty are ingrained in the Hispanic culture (Gallegos-Castillo, 2006; Gann & Duignan, 1986;). Family relationships are intense and frequent, and the elders of both sexes are honored for their accomplishments, their wisdom and insight, and the sacrifices they have made for their family (Smart and Smart, 1995). Hence, high family functioning plays a particularly vital role in the prevention of substance use among Hispanic adolescents. Such a link has been repeatedly demonstrated in previous studies of adolescents across various ethnic groups. Specifically, divorce (Price & Kunz, 2003), low cohesion and high conflict among family members (Foster et al., 2007; Nation & Heflinger, 2006; Walker et al., 2007; Wills & Yaeger, 2003;), less affectionate relationships (Foster et al., 2007; Tilson et al., 2004; Unger et al., 2001; White, Johnson, & Buyske, 2000;), and low acceptance and low behavioral control over the adolescent (Chassin, Presson, and Rose, 2005; van der Vorst et al., 2007) and low parental support (Walker et al., 2007; Wills & Yaeger, 2003; Wills et al., 2004) are associated with the initiation, frequency and intensity of adolescent substance use.

On the contrary, a healthy parent-child relationship characterized by parental monitoring of adolescents' whereabouts and parental participation in school activities is associated with lower rates of adolescent substance use (Barnes et al., 2006; Blanton et al., 1997; Wang et al., 1999; Wills & Yaeger, 2003). Furthermore, adolescents who perceive that they can comfortably discuss their feelings, opinions, and problems (including those relevant to substance use) with family members are less likely to use substances (Li, Stanton, &

Feigelman, 2000; O'Byrne, Haddock, & Poston, 2002; Simons-Morton et al., 1999;).

Self-Image and Substance use

Self-image has been described as one's description of oneself in particular roles and situations, for example, being a guest at a party or playing a sport (Kinch, Falk, & Anderson, 1983). A negative self-image may contribute to substance use among Hispanic adolescents. Research indicates that Hispanics score significantly lower than other ethnic groups in living up to one's own expectations, to the expectations of others, and feelings of success (Moneta, Schneider, & Csikszentmihalyi, 2001). It is believed that decisions to perform specific behaviors (e.g., smoke a cigarette, drink a beer) are often strategies used to re-affirm or enhance an existing self-image (Burton et al., 1989; McCool, Cameron, & Petrie, 2001). For example it has been suggested that taking up smoking or drinking is one way for adolescents to bolster their identity when they have a weak self-concept (Chassin, Tetzloff, & Hershey, 1985; Chen & Weiss, 2007; Weiss et al., 2006;). Dimensions of the self-image that have been associated with adolescent substance use include physical competence self-image (Rodriguez & Audrain-McGovern, 2005), social self-image (Laukkanen et al., 2001; Sussman, Unger, & Dent, 2004;), global self-image among males (Laukkanen, et al., 2001), and sexual self-image among females (Laukkanen et al., 2001). All of these findings suggest that adolescents with low self-image are more likely to use substances. However the painful irony is that individuals who use substances on a regular basis are more likely to experience a diminished self-image (Friedman, et al., 2004). Hence, self-image is a vital construct to examine among adolescents in relation to substance use.

Self-Image: The link between family functioning and substance use?

Previous studies have repeatedly demonstrated links between poor family functioning (e.g., Nowlin & Colder, 2007; Price & Kunz, 2003; Wills & Yaeger, 2003) and low self-image (e.g., Bradizza, Reifman, & Barnes, 1999; Laukkanen et al., 2001; McCool, Cameron, & Petrie, 2001) with adolescent substance use. However, it is not

clear whether family functioning and self-image characteristics make independent contributions to adolescent substance use, or whether the two constructs together form a pathway leading to substance use. In their review, Wills and Jager (2003) suggest that family variables often do not have pure direct links to adolescent substance use; rather individual characteristics of the adolescent such as positive mood and behavioral self-control often mediate the relationship between the two constructs. In other words, family variables are associated to adolescent substance use through their mutual association with personality characteristics of the adolescent.

Previous studies suggest that low family functioning is associated with low self-image, which is consistent with the possibility that negative self-image mediates the link between family functioning and substance use. For example, there is evidence that adolescents' perceptions of low support from family members have been associated with low self-esteem (Miyamoto et al., 2001) and low personal adjustment (Lipschitz-Elhawi & Itzhaky, 2005). Dysfunctional family structure, inadequate parenting discipline skills, lack of support from parents, and parental monitoring of children's whereabouts are strongly associated with the adolescent's selection desire to fill a void and associate with substance-using friends and with the tendency to experiment with smoking and other substance use (Blanton et al., 1997; Eitle, 2005).

In addition to the mutual connection that family functioning and self-image have to substance use, previous studies suggest that these two variables are also associated with acculturative processes among Hispanic adolescents. Adolescents who are acculturated to U.S. are more strongly influenced by their peers relative to family members, which is consistent with the hypothesis that family bonds are weakened through acculturation (Elder et al, 1995). Negative self esteem develops from feelings of isolation, and of a new, unwelcoming culture (Gil, Vega, & Dimas, 1994; Hernandez, 2000). Highly acculturated Hispanics are at increased risk for drug use and mental health problems

because of culturally-based conflicts (Conway, Swendsen, Dierker, Canino, & Merikangas, 2007; Gil et al, 1994; Hernandez, 2000). Among Hispanic adolescents, the need to translate English into Spanish for their parents is associated with negative self esteem (Weisskirch, 2007). These findings highlight the need to account for the varying levels of acculturation among the participants of the present study.

The present study

Wills and Jager (2003) suggested that additional research is needed to identify variables that mediate the relationship between family processes and adolescent substance use. By doing so, researchers can better understand the timing and sequence of variables that form a pathway to substance use, rather than examining associations of single variables to substance use. Furthermore, Weiss and colleagues (2006) suggest that more research is needed to determine ethnic differences in the influences of the family and self-image on adolescent substance use. Although they found relationships between family functioning, self-image, and smoking initiation among ethnic subgroups of Asian American adolescents, it is not clear whether such patterns exist among other ethnic groups such as Hispanics. Hispanics have very dense, supportive family networks that are a source of emotional and social support (Kim & McKenry, 1998). Hence, a breakdown in the family network may be related to a negative self-image and substance use among Hispanic adolescents who have not shed all values that are a part of Hispanic culture.

To elaborate upon the findings of previous studies, the goal of this study was to determine the independent associations of family functioning and self-image with lifetime smoking and alcohol use within the past year, as well as to examine whether self-image mediates the effects of family functioning on adolescent substance use among Hispanic adolescents. Similar to the findings of previous studies cited earlier, we predicted that both family functioning and self-image would be associated with lifetime smoking and alcohol use. Secondly, we predicted that some of the

association between family functioning and substance use would be mediated through self-image scores for two reasons: (1) a negative self-image has been associated with both poor family relationships and substance use in previous studies (e.g., Lipschitz-Elhawi & Itzhaky, 2005; Miyamoto et al., 2001; Weisskirch, 2007), and (2) previous studies have shown that adolescent personality characteristics mediate relationships between family variables and adolescent substance use (Wills & Jager, 2003).

Methods

Sample

Approximately 4300 students from 4 middle schools (grades 6-8) and 6 high schools (grades 9-12) in three school districts in Los Angeles County, California, were invited to participate in the study in 2001. These schools were selected because the majority of the students in these schools were either Latino/Hispanic or Asian American, the two ethnic groups that were of primary interest to the principal investigator and are prevalent in Los Angeles County. Participants were 7-12th graders, with the majority of them (70.2%) being 8th and 9th graders. The reason behind the primary selection of these two grades is that adolescents are most likely to experience stress and self-identity crisis during the transition from the 8th grade (the end of middle school) to the 9th grade (the beginning of high school). Therefore at this period, they are at higher risk for starting to smoke and drink alcohol (United States Department of Health and Human Services, 1994).

Of the approximately 4300 students invited to participate, 3,598 of them were successfully recruited, which corresponds to a participation rate of nearly 85% (Weiss & Weiss, 2002). The analytic sample for this study was the 1,598 students who self-identified their ethnicity as Latino/Hispanic. The majority of them (52.9%) reported that they were of Mexican origin, while nearly one in five (18.8%) were of Cuban origin and 8.7% were of Guatemalan origin. Most of the participants were 8th and 9th graders

(68.1%), with a mean age of 14.12 (SD = 1.30) years.

Procedure

Participants were recruited in individual classrooms by one researcher- an Asian female doctoral student who was in her late thirties and had a background in clinical child psychology. The researcher explained the study briefly while displaying an objective, nonjudgmental attitude toward substance use. The researcher emphasized that participation in this study was an opportunity for them as adolescents to “have their voices heard” (Weiss & Weiss, 2002). Those students who volunteered signed student assent forms and were given parental consent forms to take home for their parents to sign.

On the researcher’s return visit, students who presented both signed forms were administered a paper-and-pencil survey consisting of 149 items. Students were assured that their participation was anonymous and voluntary. That is, no names were requested on the questionnaires, and participants had the right to discontinue completing the survey at any time with no penalty. Participants were instructed that there were no “right” or “wrong” answers, and that honest responses were crucial to the study. They completed during a single class period; surveys were collected immediately upon completion. Although completion of the survey was not mandatory, none of the participants discontinued completing the survey during the administration process.

Measures

Lifetime smoking. To assess lifetime smoking, one question was asked, “Have you ever tried smoking, even a few puffs?” Those students who responded “no” and “yes” were respectively coded as “non-smokers” and “lifetime smokers.”

Alcohol use. To assess alcohol use, respondents were asked how many times they have used alcohol in the past year with four choices: “none”, “a few times”, “about once a month”, and “about once a week”. Those students who responded “none” were coded as non-alcohol

users, while students who responded with any of the other responses were coded as alcohol users.

We chose a larger timeframe for the smoking variable (lifetime) compared to the alcohol use variable (past year) because alcohol use is more common than tobacco use among adolescents (Centers for Disease Control and Prevention, 2005; Substance Abuse and Mental Health Services Administration, 2006). Therefore our intention was to use a timeframe that was appropriate for the given substance and the population being studied.

Self-image. Forty-eight items were adapted from the Piers-Harris Children's Self-Concept Scale (Piers, 1969). This is a self-report questionnaire developed especially for work with children. Its items cover many areas of the self-image, including health and physical characteristics, behavior at home and schools, enjoyment of recreation, abilities in sports and play, intellectual abilities, personality characteristics, and emotional tendencies. Items included: "I get nervous when the teacher calls on me", "I cause trouble to my family", "I'm good looking", and "I am smart". Response options ranged from: 1 = "Strongly disagree", 2 = "Disagree", 3 = "Neither agree nor disagree", 4 = "Agree", and 5 = "Strongly agree". Answers to all scores were summed and divided by 48 (the number of items) to create a mean self-image score for each participant, ranging from 0 to 5. The obtained Cronbach's alpha for the items with the analytic sample was .88.

Family functioning. Twenty-five items were adapted from the Family Functioning in Adolescence Questionnaire (FFAQ). The FFAQ is a 42-item self-report measure that uses 5-point scales to assess the psychosocial health of the family as perceived by the adolescent (Roelofse & Middleton, 1985). The measure is based on a model integrating family systems theory, developmental tasks and identity formation of the adolescent. The FFAQ has six dimensions: structure, affect, communication, behavior control, value transmission, and external system. Items included were: "In our family, we don't spend our free time together", "We show that we care for each other in our family", "My parents

want me to try my best whatever I do," and "My parents still treat me like a child and not like a maturing person." Response options ranged from: 1="Strongly disagree", 2= "Disagree", 3= "Neither agree nor disagree", 4= "Agree", and 5= "Strongly agree". Similar to our self-image scores, answers to all family functioning scores were summed and divided by the number of items (25) to create a mean family functioning score ranging from 0 to 5. The obtained Cronbach's alpha for the items with the analytic sample was .90.

Covariates. To control for confounding, the demographic variables of gender, school type (middle school or high school), socio economic status (SES), generation status of the adolescent (first, or second, or third immigrant generation in the US), acculturation, living with both parents (yes or no), parents' smoking, friends' smoking, age, and acculturation status were treated as potential covariates. Acculturation and generation status were considered as potential covariates because acculturative processes have been associated with adolescents' relationships with the family and their psychological status, which in turn are associated with adolescent substance use (Elder et al., 1995; Alegria et al., 2007). To determine whether the participant lived with both parents, students were asked about their living arrangement. The response options were, "Live with both parents", "Live with mother", "Live with father", and "Others" (blank space provided). Our indicator of SES was whether or not the adolescent's parents rent the house that the family lives in. We chose this question because responses to traditional measures about other indicators of SES, including parental occupation, education, and income are often difficult for adolescents to report accurately (Shakib et al., 2003). It has been suggested that home ownership is a valid measure of socioeconomic status (Laaksonen et al., 2008; Megbolugbe & Lineman, 1993).

Data analysis

Descriptive statistics were calculated for the demographic variables, family functioning, and self-image. Next, chi-square tests and t-tests were calculated to compare substance users and

non-users on all of the aforementioned variables ($\alpha = .05$). Demographic variables that significantly distinguished users from non-users of either cigarettes or alcohol were treated as covariates in the subsequent analyses. Logistic regression models were performed to examine whether family functioning and self-image were independently associated with substance use, both before and after controlling for demographic covariates. Baron and Kenny (1986) state that the necessary conditions to test mediational analyses are the following: (1) the independent variable is significantly associated with the potential mediator variable, (2) the potential mediator variable is associated with the dependent variable, and (3) statistical control of the mediator variable reduces or eliminates the independent-dependent variable relationship. To test these conditions, the following analyses were performed: (1) linear regression of self-image (the mediator) on family functioning (the independent variable), (2) logistic regression of each substance use variable (the dependent variables) on self-image (the mediator), and (3) multiple logistic regression of the two substance use variables, with the mediator variable (self-image) entered in Step 1 and the independent variable (family functioning) entered in Step 2. Effect sizes were calculated for the standardized regression coefficients and odds ratios using equations presented in Chinn (2000) and Soper (2008). Where all 3 conditions of mediation listed above were met, a post hoc bootstrapping technique (Preacher & Hayes, 2004) was used to determine whether significant mediation effects existed, after controlling for demographic covariates.

Because participants were nested in their respective schools, all of the analyses relevant to hypothesis testing were adjusted for school levels of lifetime smoking (where smoking was the dependent variable) and past month alcohol use (where alcohol use was the dependent variable). As such, hierarchical models were employed.

Results

Differences among substance users and non-users

Table 1 presents characteristics of the analytic sample. Slightly over half (51.6%) of the participants were female. Of the 1,598 participants, 593 of them (37.1%) reported smoking at least once in their lifetime, and 848 (53.1%) of them reported drinking alcohol at least once in the past year. The majority of the respondents reported that they were attending high school (72.6%), lived in a rented home (61.2%), were second generation American (51.2%), and lived with both parents (61.1%). Nearly one in three (35%) reported that at least one parent currently smokes cigarettes, and 39% reported that they have at least one friend who smokes. Mean age was 14.12 years ($SD = 1.30$). Mean acculturation was 37.59 ($SD = 8.47$), with possible scores ranging from 11 to 55. With possible scores ranging from 1-5, mean family functioning was 3.58 ($SD = 0.63$), and self-image was 3.73 ($SD = 0.48$).

Table 1 also displays chi-square and t-test statistics that examined differences among substance users and non-users on demographic variables, family functioning, and self-image. Descriptive statistics are presented for the 593 lifetime smokers and 848 past year alcohol users. Surprisingly, a higher proportion of girls (56.2%) reported drinking alcohol in the past year than boys (50.4%; $p < .05$), but no significant gender differences were found for lifetime smoking prevalence. Those who attended high school had higher rates of smoking and alcohol use compared to those who attended middle school ($p < .0001$). Adolescents whose parents rented their homes had a higher prevalence of lifetime smoking ($p < .05$) but not past year alcohol use, than those whose parents owned their home ($p < .05$). Adolescents who lived with both parents reported lower rates of both smoking ($p < .0001$) and alcohol use ($p < .05$) compared to those who live in non-traditional households. Parents' smoking ($p < .0001$) and friends' smoking ($p < .0001$) were strongly associated with adolescents' smoking and alcohol use. Older age was associated with both smoking and alcohol use ($p < .0001$). No significant differences were found between substance users and non-users on acculturation and generation

status, and were therefore not included as covariates in subsequent analyses.

Main effects of family functioning and self-image

Table 2 displays the direct (independent) associations of family functioning and self-image with lifetime smoking and past year alcohol use. These associations were presented as odds ratios, both unadjusted and adjusted for demographic covariates. Both family functioning (AOR = .46 for smoking; AOR = .52 for alcohol) and self-image (AOR = .48 for smoking; AOR = .54 for alcohol) were strongly associated with substance use ($p < .0001$). The fact that all of the adjusted odds ratios were significantly lower than one indicated that family functioning and self-image were negatively associated with substance use. For example, family functioning was scored on a scale of one to five. Therefore the adjusted odds ratio of .46 for family functioning in the smoking model suggests that adolescents were only 46% as likely to have tried smoking relative to their peers who scored one point lower than them on family functioning.

Main effects of covariates

The adjusted odds ratios of the covariates were consistent with the following findings that were reported in Table 1: (1) parents' smoking, friends' smoking, and age were strongly associated with both smoking and alcohol use ($p < .0001$), and, (2) females were more likely to report alcohol use than males ($p < .01$), and this pattern was not found for smoking. In other words, the associations of these demographic variables with substance use remained after statistically controlling for school levels of the dependent variable and the other demographic covariates. The adjusted odds ratios for socioeconomic status (parents renting home), living with both parents and school type (high school vs. middle school), on the other hand, varied from the results presented in Table 1. Socioeconomic status was no longer associated with either substance use variable, while living with both parents was only associated with smoking ($p < .05$), but not alcohol use. Although high school students reported higher overall rates of substance use than middle school

students, the adjusted odds ratio for school type indicated that middle school students were more likely to consume alcohol in the past year than high school students. Since the odds ratio was adjusted for age, this finding suggests that middle school students are more likely to report alcohol use than their same-aged friends who are in high school. This finding is consistent with previous literature that has demonstrated a link between repeating an academic year and alcohol use (Borowsky, Ireland, & Resnick, 2002).

Mediator effects of family functioning and self-image

As mentioned earlier, the criteria for mediator effects are (1) the independent variable is significantly associated with the potential mediator variable, (2) the potential mediator variable is associated with the dependent variable, and (3) statistical control of the mediator variable reduces or eliminates the independent-dependent variable relationship. This preliminary mediator analyses for lifetime smoking and past year alcohol use are presented in Table 3. Testing #1 we found that family functioning was associated with self-image ($\beta = 0.60$; $p < .0001$), which corresponds to a large effect size according to Valentine and Cooper (2003). Self-image was a protective factor against smoking (OR = 0.48; $p < .0001$) and alcohol use (OR = 0.51; $p < .0001$), thereby satisfying the second criterion for mediation. The effect sizes for the odds ratios calculated ranged from -.34 to -.47, which correspond to medium effect sizes. Last, statistical control of self-image in the hierarchical model did reduce the protective effect of family functioning and substance use. The odds ratio of family functioning significantly increased from .43 ($p < .0001$) to 0.46 ($p < .0001$) for smoking (-2 log likelihood change = 7.39; $p < .01$) and significantly increased from 0.49 ($p < .0001$) to 0.54 ($p < .0001$) for alcohol use (-2 log likelihood change = 7.97; $p < .01$). Self-image did not completely mediate the association between family functioning and substance use, since the adjusted odds ratios of family functioning remained significant. Nevertheless, all 3 criteria were met for further testing of mediation effects.

Finally, post hoc analysis using a bootstrapping method (Preacher & Hayes, 2004) was conducted to determine whether self-image mediated the association between family functioning and substance use after controlling for the dependent variable at the school level as well as the demographic covariates that were significantly associated with the dependent variable as indicated in Table 2. The bootstrapping method produces a 95% confidence interval for the indirect effect of a mediator variable; a confidence interval that does not contain a zero within its boundaries indicates that the mediator is significant ($\alpha = .05$). The 95% confidence interval for lifetime smoking and past year alcohol use were (-.02 to .02) and (-.03 to .01), respectively, which indicated that mediator effect was not present when the all of the covariates were taken into consideration.

To further explore the proposed mediator effect, we eliminated the friends' smoking covariate and re-performed the post hoc analysis. This time, the 95% confidence interval for lifetime smoking and past year alcohol use were -.03 to -.01, and -.04 to -.01, respectively. The negative values of the confidence interval limits indicated that a low self-image enhanced the association that low family functioning had with the presence of substance use. However these mediator effects were only partial, since the direct effects of family functioning on substance use remained significant.

Discussion

In the present study we found that both low family functioning and low self-image were associated with higher rates of lifetime smoking and past year alcohol use among a sample of Hispanic adolescents. These results are consistent with previous research which suggests that dysfunctional family structure and low parental discipline, support, and parent-child communications are strongly associated with adolescents' tendency to experiment with smoking and other substances (e.g., Foster et al., 2007; Nowlin & Colder, 2007; Walker et al., 2007). Our results are also consistent with previous evidence that experimentation with substance use is a strategy that some adolescents

use to improve his or her self-image (e.g., Bradizza, Reifman, & Barnes, 1999; Burton et al., 1989; McCool et al., 2001).

In our preliminary analyses, the significant mediation effects indicated that the association between family functioning and substance use was partially attributed to the connection that both variables had with self-image. Similarly, Rosenblum and colleagues (2005) found that that low family functioning is associated with low psychological resilience among adolescents, which are both associated with substance use. Hence, efforts to enhance adolescents' self-image may partially buffer the negative effects that a dysfunctional family life has on an adolescent. Previous literature suggests that interventions designed to build self-esteem and resiliency may help adolescents cope with the disadvantages they have experienced (including family dysfunction) and, in turn, prevent risk behaviors including substance use and violence (Frank, 1996; Stockwell et al., 2005). The present study provided preliminary statistical evidence that this may be the case among Hispanic adolescents.

Our final analyses that adjusted for numerous covariates indicated that self-image did not significantly mediate the association between family functioning and adolescent substance use. Friends' smoking was the covariate that was largely responsible for this non-significant finding, since the elimination of this covariate resulted in the significant mediation effect that was observed in preliminary analyses. This finding is consistent with a plethora of evidence that links peer substance use with adolescent substance use (e.g., Koetting O'Byrne et al., 2002; Nation & Heflinger, 2006; Yeh, Chiang, & Huang, 2003). Peer influences need to be considered when designing a substance use prevention program that addresses family and self-esteem issues, since previous research suggests that adolescents are more likely to associate with substance using peers when family relationships are poor (Sussman et al., 1993a; Sussman et al., 1993b). Similarly when substances are used to enhance one's self-image (e.g., Bradizza, Reifman, & Barnes, 1999; Windle & Windle, 2006), it occurs primarily

among adolescents who keep company with substance using peers. Although previous research has found family functioning, self-image, and peer substance use behaviors to be associated with adolescent substance use (e.g., Kokkevi et al., 2007; Stiffman, Alexander-Eitzman et al., 2007; Taylor, Lloyd, & Warheit, 2005), no known studies have examined the role that peer substance use plays in the link between negative self-image and substance use. Such research would lead to a more comprehensive understanding of the complex relationships among contextual and individual factors leading to adolescent substance use.

Contrary to previous research (e.g., CDC, 2005; Gil et al., 1994), we found that Hispanic females reported higher rates of alcohol use than Hispanic males. A couple of possible explanations of this finding are presented here. First, it is possible that within our sample of adolescents, females were more exposed to alcohol use relative to their male classmates through associations with older peers, therefore increasing their rates of alcohol consumption. In a retrospective study of college students, Raffaelli (2005) found that Hispanic females tended to have their first romantic relationship with an older male. Secondly, it has also been suggested that Hispanic females are more susceptible to advertisers' appeals to alcohol use and smoking as a means of demonstrating their independence (Epstein, Botvin, & Diaz, 1998). Such may be the case in our sample.

"La familia" is a revered term in the Hispanic culture used to describe the nuclear family as well as the extended family and close community (Kim & McKenry, 1998). In the Hispanic culture, the family is seen as a problem-solving unit for various issues including economic assistance, encouragement, support, and even personal development. Therefore the family unit is particularly important in the prevention of substance use among Hispanics, since they often underutilize professional services such as psychological counseling (Kim & McKenry, 1998). Although the Hispanic culture is characterized as having a deep respect for its family members (Smart & Smart, 1995), previous research suggests that as

individuals, Hispanics suffer from a low self-image relative to other ethnic groups (Moneta, Schneider, & Csikszentmihalyi, 2001). Hence, examining the interrelationships among family functioning, self-image, and substance use among Latino adolescents was of great importance in the present study.

Limitations

Several limitations of the present study need to be considered despite the fact that the findings were consistent with our hypotheses. First, because the design of this study is cross-sectional, causal relationships between variables cannot be inferred. Hill (1965) suggests that for causal relationship to be established, the independent variable (as well as the mediator variable) must precede the dependent variable. Although our findings suggested provided statistical evidence that low family functioning is associated with low self image, which in turn is associated with substance use (dose-response relationships, another criterion for causation according to Hill (1965)), we cannot be completely certain that low family functioning preceded the occurrence of a low self-image. A longitudinal study is needed to clarify the nature of the associations between self-image, family functioning, and substance use.

The present study posed very little risk to the participants, as the data collected was voluntary, self-reported, and anonymous. However, the direct benefits of participating in this study were relatively small in comparison to intervention studies, in which participants receive education and training curricula that are designed to prevent substance use.

The results of this study are entirely based on participants' self-reports on a paper-and-pencil survey. Although the participants were assured that their responses were anonymous, they may have underreported cigarette and alcohol use in an attempt to avoid punishment or to present themselves in a socially desirable way (Ong & Weiss, 2000). Personality characteristics and current moods may also influence their perceptions of family functioning and self-image at the time of the assessment. Therefore,

interpretation of self-reported data should be made with caution.

Our results are based on a sample of 8th and 9th grade Hispanic students in Los Angeles County, who were most often the ethnic majority in their schools. In this environment, Hispanic students may be more likely to maintain a strong cultural identity compared to their Hispanic counterparts who are an ethnic minority in other schools. A strong cultural identity in turn may influence one's perceptions of family functioning and self-image. Therefore it is possible that the findings of this study do not generalize as well to non-Hispanic adolescents, as well as Hispanic adolescents who are ethnic minorities in the social setting. Furthermore, the findings of this study may not be equally relevant to all Hispanic subgroups that exist in the United States, since the majority of the sample consisted of Mexican American and Cuban American adolescents.

Conclusion

It has been suggested that substance use programs targeting Hispanics of varied immigration patterns should continue to consider the interrelationship of individual characteristics

and family influences (Alegria et al., 2007; Conway et al., 2007). The unique contribution of this study is the possibility that a threatened self-image, which often makes adolescents susceptible to substance use, may be partially attributed to poor family functioning. Longitudinal research is needed to determine the sequential order and timing of these variables in their relation to substance use.

Understanding how family functioning and self-image influence Hispanic adolescent smoking and alcohol use behaviors may facilitate the construction of more culturally appropriate, developmentally appropriate, and effective substance use prevention programs. When developing such programs, the negative influence that substance using friends have on adolescent substance use needs to be considered. Since the Hispanic American population includes individuals originating from a variety of countries, additional research is needed to examine family functioning, self-image, and substance use among individual Hispanic subgroups including Mexican Americans, Cuban Americans, and Puerto Ricans, to name a few.

References

- Alegria, M., Mulvaney-Day, N., Torres, M., Polo, A., Zhun, C., Canino, G. (2007). Prevalence of psychiatric disorders across Latino subgroups in the United States. *American Journal of Public Health* 97(1):68-75.
- Barnes, G., Hoffman, J., Welte, J., Farrell, M., Dintcheff, B. (2006). Effects of parental monitoring and peer deviance on substance use and delinquency. *Journal of Marriage & Family* 68(6):1084-1104.
- Blanton, H., Gibbons, F.X., Gerrard, M. (1997). Role of family and peers in the development of prototypes associated with substance use. *Journal of Family Psychology* 11(3):271-288
- Baron, R.M., Kenny, D.A. (1986). The moderator-mediator variable distinction in social-psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality & Social Psychology* 51:1173-1182.
- Borowsky, I.W., Ireland, M., Resnick, M.D. (2002). Violence risk and protective factors among youth held back in school. *Ambulatory Pediatrics* 2(6): 475-484.
- Bradizza, C., Reifman, A., Barnes, G. (1999). Social and coping reasons for drinking: predicting alcohol misuse in adolescents. *Journal of Studies on Alcohol* 60(4): 491-499.
- Burton, D., Sussman, S., Hansen, W.B., Johnson, C.A., Flay, B. (1989). Image attributions and smoking intentions among seventh grade students. *Journal of Applied Social Psychology* 19:656-664.
- Campbell, R. (2006). Teenage girls and cellular phones: discourses of independence, safety, and 'rebellion.' *Journal of Youth Studies* 9(2):195-212.
- Centers for Disease Control and Prevention (2005). *Youth Risk Behavior Survey*. Retrieved April 1, 2008, from the Youth Risk Behavior Surveillance Survey. Web site: <http://www.cdc.gov/yrbss>.

- Chassin, L., Tetzloff, C., Hershey, M. (1985). Self- image and social-image factors in adolescent alcohol use. *Journal of Studies on Alcohol* 46(1):39-47.
- Chassin, L., Presson, C., Rose, J., Sherman, S., Davis, M., Gonzalez, J. (2005). Parenting style and smoking onset. *Journal of Pediatric Psychology* 30(4):334-344.
- Chen, X.G., Weiss, J.W. (2007). Enrichment in early childhood, self-concept and cigarette smoking among adolescent minorities in California: a mediation model effect analysis. In: Grenell, R.S., ed. *Adolescent behavior research studies*. Hauppauge, NY: Nova Science Publishers, Inc.
- Chinn, S. (2000). A simple method for converting an odds ratio to effect size for use in meta-analysis. *Statistics in Medicine* 19:3127-3131.
- Conway, K., Swendsen, J., Dierker, L., Canino, G., Merikangas, K. (2007). Psychiatric comorbidity and acculturation stress among Puerto Rican substance abusers. *American Journal of Preventive Medicine* 32:219-225.
- Delva, J., Wallace, J.M, O'Malley, P.M., Bachman, J.G., Johnston, L.D., Schulenberg, J.E. (2005). The epidemiology of alcohol, marijuana, and cocaine use among Mexican American, Puerto Rican, Cuban American, and Latin American eighth-grade students in the United States: 1991-2002. *American Journal of Public Health* 95:696-702.
- Eitle, D. (2005). The moderating effects of peer substance use on the family structure-adolescent substance use association: quantity versus quality of parenting. *Addictive Behaviors* 30:963-980.
- Elder, J.P., Vargas, R., Sallis, J.F., Woodruff, S.I., Moreno, C., Deosaransingh, K. (1995). Acculturation and smoking among Latino youth. *Health Values: The Journal of Health Behavior, Education, and Promotion* 19(3):43-52.
- Epstein, J.A., Botvin, G.J., Diaz, T. (1998). Linguistic acculturation and gender effects on smoking among Hispanic youth. *Preventive Medicine: An International Journal Devoted to Practice and Theory* 27(4):583-589.
- Foster, S., Jones, D., Olsen, A., Forehand, R., Gaffney, C., Zens, M., Bau, J. (2007). Family socialization of adolescent's self- reported cigarette use: the role of parents' history of regular smoking and parenting style. *Journal of Pediatric Psychology* 32(4):481-493.
- Frank, I.C. (1996). *Building self-esteem in at-risk youth: peer group programs and individual success stories*. Westport, CT: Praeger Publishers/Greenwood Publishing Group.
- Friedman, A.S., Terras, A. Zhu, W. (2004). Depression, negative self-image, and suicidal attempts as effects of substance use and substance dependence. *Journal of Addictive Diseases*, 23(4):55-71.
- Gallegos-Castillo, A. (2006). La Casa: negotiating family cultural practices, constructing identities. In: Denner, J., Guzman, B.L., eds. *Latina Girls: voices of adolescent strength in the United States*. New York: New York University Press.
- Gann, L.H., Duignan, P. (1986). The Hispanic in the United States: a history. *Library Journal* 111(19):107.
- Gil, A.G., Vega, W.A., Dimas, J.M. (1994). Acculturative stress and personal adjustment among Hispanic adolescent boys. *Journal of Community Psychology* 22(1):43-54.
- Griffin, K.W., Scheier, L.M., Botvin, G.J., Diaz, T. (2000). Ethnic and gender differences in psychosocial risk, protection, and adolescent alcohol use. *Prevention Science* 1:199-212.
- Grucza, R.A., Bierut, L.J. (2006). Cigarette smoking and the risk for alcohol use disorders among adolescent drinkers. *Alcoholism: Clinical and Experimental Research*, 30:2046-2054.
- Hernandez, M. (2000). Puerto Rican families and substance abuse. In: Krestan, J.-A., ed. *Bridges to recovery: addiction, family therapy, and multicultural treatment*. New York: Free Press.
- Hill, A. B. (1965). The environment and disease: associations or causation? *Proceedings of the Royal Society of Medicine* 58:295-300.

- Kandel, D.B. (2002). Examining the gateway hypothesis: stages and pathways of drug involvement. In: Kandel, D.B., ed. *Examining the gateway hypothesis: stages and pathways of drug involvement*. New York: Cambridge University Press.
- Kandel, D.B., Kiros, G-E., Schaffran, C., Hu M-C. (2004). Racial/ethnic differences in cigarette smoking initiation and progression to daily smoking: A multilevel analysis. *American Journal of Public Health* 94:128-135.
- Kim, H.K., McKenry, P.C. (1998). Social networks and support: a comparison of African Americans, Asian Americans, Caucasians, and Hispanics. *Journal of Comparative Family Studies* 29(2):313–334.
- Kinch, J., Falk, F., Anderson, D. (1983). A self-image and social-image factors in adolescent alcohol use. *Journal of Studies on Alcohol* 46(1):39-47.
- Koetting O'Byrne, Haddock, C.K., Poston, W.S.C., Mid America Heart Institute (2002). Parenting style and adolescent smoking. *Journal of Adolescent Health* 30:418-425.
- Kokkevi, A., Richardson, C., Florescu, S., Kuzman, M., Stergar, E. (2007). Psychosocial correlates of substance use in adolescence: a cross- national study in six European countries. *Drug and Alcohol Dependence* 86(1):67-74.
- Laaksonen, M., Martikainen, P., Nihtilä, E., Rahkonen, O., Lahelma, E. (2008). Home ownership and mortality: A register-based follow-up study of 300,00 Fins. *Journal of Epidemiology and Community Health* 62:293-297.
- Laukkanen, E., Shemeikka, S., Viinamaki, H., Polkki, P., Lehtonen, J. (2001). Heavy drinking is associated with more severe psychosocial dysfunction among than boys in Finland. *Journal of Adolescent Health* 28(4):270-277.
- Li, X., Stanton, B., Feigelman, S. (2000). Impact of perceived parental monitoring on adolescent risk behavior over 4 years. *Journal of Adolescent Health* 27:49-56.
- Lipschitz-Elhawi, R., Itzhaky, H. (2005). Social support, mastery, self-esteem and individual adjustment among at-risk youth. *Child & Youth Care Forum* 34(5):329-346.
- McCool, J.P., Cameron, L.D., Petrie, K.J. (2001). Adolescent perceptions of smoking imagery in film. *Social Science and Medicine* 52(10):1577-1587.
- Megbolugbe, I.F., Lineman, P.D. (1993). Home Ownership. *Urban Studies* 30:659-682.
- McGrady, B.S. (2006). Family and other close relationships. Miller, W.R, Carroll, K.M., eds. *Family and other close relationships*. New York: Guilford Press.
- Miyamoto, R.H., Hishinuma, E.S., Nishimura, S.T., Nahulu, L.B., Andrade, N.N., Goebert, D.A., Carlton, B.S. (2001). Path models linking correlates of self-esteem in a multi-ethnic adolescent sample. *Personality and Individual Differences* 31(5):701-712.
- Moneta, G., Schneider, B., Csikszentmihalyi, M. (2001). A longitudinal study of the self- concept and experimental components of self worth and affect across adolescence. *Applied Developmental Science* 5(3):125-142.
- Nation, M., Heflinger, C.A. (2006). Risk factors for serious alcohol and drug use: the role of psychosocial variables in predicting the frequency of substance use among adolescents. *The American Journal of Drug and Alcohol Abuse* 32:415-433.
- Nowlin, P., Colder, C., (2007). The role of ethnicity and neighborhood poverty on the relationship between parenting and adolescent cigarette use. *Nicotine & Tobacco Research* 9(5):545-556.
- Nyamanthi, A., Longshore, D., Keenan, C., Lesser, J., Leake, B. (2001). Childhood predictors of daily substance use among homeless women of different ethnicities. *American Behavioral Scientist* 45:35-50.
- O'Byrne, K., Haddock, C.K., Poston, W. (2002). Parenting style and adolescent smoking. *Journal of Adolescent Health* 30(6):418-425.
- Ong, A., Weiss, D. (2000). The impact of anonymity on responses to sensitive questions. *Journal of Applied Social Psychology* 30(8):1691-1708.

- Piers, E., Harris, D. (1969). *The Piers-Harris Children's Self Concept Scale*. Nashville, TN: Counselor Recordings and Tests.
- Preacher, K.J., Hayes, A.F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers* 36(4):717-731.
- Price, C., Kunz, J. (2003). Rethinking the paradigm of juvenile delinquency as related to divorce. *Journal of Divorce & Remarriage* 39(1-2):109-133.
- Raffaelli, M. (2005). Adolescent dating experiences described by Latino college students. *Journal of Adolescence* 28(4):559-572.
- Rodriguez, D., Audrain-McGovern, J. (2005). Physical activity, global physical self-concept, and adolescent smoking. *Annals of Behavioral Medicine* 30(3):251-259.
- Roelofse, R., Middleton, M. (1985). The family functioning in adolescence questionnaire: a measure of psychosocial family health during adolescence. *Journal of Adolescence* 8(1):33-45.
- Rosenblum, A., Magura, S., Fong, C., Cleland, C., Norwood, C., Casella, D., Truell, J., Curry, P. (2005). Substance use among adolescents in HIV-infected families: Resiliency, peer deviance, and family functioning. *Substance Use and Misuse* 40(5):581-603.
- Shakib, S., Mouttapa, M., Johnson, C.A., Ritt-Olson, A., Trinidad, D.R., Gallaher, P.E., Unger, J.B. (2003). Ethnic variation in parenting characteristics and adolescent smoking. *Journal of Adolescent Health* 33:88-97.
- Simons-Morton, B., Crump, A.D., Haynie, D.L., Saylor, K.E., Eitel, P., Yu, K. (1999). Psychosocial, school, and parent factors associated with recent smoking among early-adolescent boys and girls. *Preventive Medicine* 28:138-148.
- Smart, J., Smart, D. (1995). Acculturative stress: the experience of the Hispanic immigrant. *The Counseling Psychologist* 23:25-42.
- Soper, D.S. (2008). The free statistics calculators website, online software: <http://www.danielsoper.com/statcalc/>
- Stiffman, A., Alexander-Eitzman, B., Silmere, H., Osborne, V., Brown, E. (2007). From early to late adolescence: American Indian youths' behavioral trajectories and their major influences. *Journal of the American Academy of Child & Adolescent Psychiatry* 46(7):849-858.
- Stockwell, T., Gruenwald, P.J., Toumbourou, J.W., Loxley, W. (2005). Preventing Risky Drug Use and Related Harms: The Need for a Synthesis of New Knowledge. In: Stockwell, T., Gruenwald, P.J., Toumbourou, J.W., Loxley, W., eds. *Preventing harmful substance use: The evidence base for policy and practice*. New York: John Wiley & Sons Ltd.
- Substance Abuse and Mental Health Services Administration (2006). *Start talking before they start drinking: A family guide*. Retrieved April 1, 2008, from Substance Abuse and Mental Health. Web site: http://family.samhsa.gov/media/familyguide/Underagebrochure_10_27_released_2.pdf
- Sussman, S., Dent, C., Simon, T., Stacy, A. (1993). Identification of which high risk youth smoke cigarettes regularly. *Health Values: The Journal of Health Behavior, Education & Promotion* 17(1):42-53.
- Sussman, S., Dent, C., Stacy, A., Sun, P., Craig, S., Simon, T., et al. (1993). Project towards no tobacco use: 1- year behavior outcomes. *American Journal of Public Health* 83(9):1245-1250.
- Sussman, S., Unger, J.B., Dent, C.W. (2004). Peer group self-identification among alternative high school youth: A predictor of their psychosocial functioning five years later. *International Journal of Clinical and Health Psychology* 4(1):9-25.
- Taylor, J., Lloyd, D.A., Warheit, G.J. (2005). Self-derogation, peer factors, and drug dependence among a multiethnic sample of young adults. *Journal of Child and Adolescent Substance Abuse* 15(2):39-51.

- Tilson, E.C., McBride, C.M., Lipkus, I.M. (2004). Testing the Interaction Between Parent-Child Relationship Factors and Parent Smoking to Predict Youth Smoking. *Journal of Adolescent Health* 35(3):182-189.
- United States Department of Health and Human Services (1994). *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, Georgia: US Department of Health and Human Services Public Health Service, CDC National Center for Chronic Disease and Prevention, and Health Promotion Office on Smoking and Health.
- Unger, J.B., Rohrbach, L.A., Howard-Pitney B, Ritt-Olson, A., Mouttapa, M. (2001). Peer influences and susceptibility to smoking among Californian adolescents. *Substance Use and Misuse* 36:551-571.
- United States Census Bureau (2004). *We the people: Hispanics in the United States*. Retrieved January 2, 2008, from United States Census Bureau. Web site: <http://www.census.gov/prod/2004pubs/censr-18.pdf>
- Valentine, J.C. Cooper, H. (2003). What works clearinghouse study design and implementation device (Version 1.0). Washington, DC: U.S. Department of Education.
- Van der Vorst, H., Engels, R.C., Meeus, W., Dekovic, M. (2006). Parental attachment, parental control, and early development of alcohol use: a longitudinal study. *Psychology of Addictive Behaviors* 20(2):107-116.
- Walker C., Ainette, M., Wills, T., Mendoza, D. (2007). Religiosity and substance use: Test of an indirect-effect model in early and middle adolescence. *Psychology of Addictive Behaviors* 21(1):84-96.
- Wang, M., Fitzhugh, E., Lee Green, B., Turner, L., Eddy, J., Westerfield, R. (1999). Prospective social-psychological factors of adolescent smoking progression. *Journal of Adolescent Health* 24(1):2-9.
- Weiss, J.W., Cen, S., Schuster, D.V., Unger, J.B., Johnson, C.A., Mouttapa, M., Schreiner, W.S., Cruz, T.B. (2005). Longitudinal effects of pro-tobacco and anti-tobacco messages on adolescent smoking susceptibility. *Nicotine & Tobacco Research* 8(3):455-465.
- Weiss, J.W., Garbanati, J.A., Tanjasiri, S.P., Palmer, P.H. (2006). Effects of family functioning and self-image on adolescent smoking initiation among Asian American subgroups. *Journal of Adolescent Health* 39:221-228.
- Weiss, J.W., Weiss, D.J. (2002). Recruiting Asian-American adolescents. *Journal of Child and Family Studies* 11:143-149.
- Weisskirch, R. (2007). Feelings about language brokering and family relations among Mexican American early adolescents. *Journal of Early Adolescence* 27(4):545-561.
- White, H., Johnson, V., Buyske, S. (2000). Parental modeling and parental behavior effects on offspring alcohol and cigarette use: a growth curve analysis. *Journal of Substance Abuse* 12(3):287-310.
- Wills, T.A., Yager, A.M. (2003). Family factors and adolescent substance use: Models and mechanisms. *Current Directions in Psychological Science* 12(6):222-226.
- Wills, T.A., Resko, J.A., Ainette, M.G., (2004). Role of Parent Support and Peer Support in Adolescent Substance Use: A Test of Mediated Effects. *Psychology of Addictive Behaviors* 18(2):122-134.
- Windle, M., Windle, R.C. (2006). Adolescent temperament and lifetime psychiatric and substance abuse disorders assessed in young adulthood. *Personality and Individual Differences* 41(1):15-25.
- Yeh M.-Y., Chiang, I.-C., Huang, S.-Y. (2003). Gender differences in predictors of drinking behavior in adolescents. *Addictive Behaviors* 31:1929-1938.

Author Information

Michele Mouttapa, Ph.D. *
Department of Health Science
California State University, Fullerton
800 N. State College Blvd.
Fullerton, CA 92831.
E-mail: mmmouttapa@fullerton.edu.

Jie W. Weiss, Ph.D.
Department of Health Science
California State University, Fullerton

Mary Hermann, MPH
Department of Health Science
California State University, Fullerton

* corresponding author

Appendix A

Table 1.Characteristics of the sample by substance use status

	Total (n = 1598)		Lifetime smokers (n = 593)			Past year alcohol users (n = 848)		
	<u>n</u>	<u>%</u>	<u>n</u>	<u>%</u>	χ^2	<u>n</u>	<u>%</u>	χ^2
<i>Gender</i>					2.42 (ns)			5.30*
Female	804	51.6	284	35.4		451	56.2	
Male	753	48.4	295	39.2		378	50.4	
<i>School Type</i>								
Middle school	434	27.4	107	18.2	40.10***	187	22.2	23.77***
High school	1148	72.6	481	81.8		654	77.8	
<i>Parents rent home</i>					5.50*			0.03 (ns)
Yes	956	61.2	380	39.8		511	53.6	
No	607	38.8	206	33.9		326	54.0	
<i>Generation Status</i>					0.53 (ns)			3.39 (ns)
1st generation	323	21.2	122	37.8		159	49.7	
2nd generation	782	51.2	281	36.0		409	52.4	
3rd+ generation	421	27.6	159	37.9		236	56.3	
<i>Living with both parents</i>					15.56***			5.76*
Yes	977	61.1	268	43.2		353	57.0	
No	621	38.9	325	33.4		495	50.9	
<i>At least one parent smokes</i>								
Yes	541	35.0	246	43.6	28.73***	339	41.6	33.06***
No	1003	65.0	318	56.4		476	58.4	
<i>At least one friend smokes</i>								
Yes	605	39.0	341	60.6	172.70***	433	53.1	144.00***
No	946	61.0	222	39.4		383	46.9	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>	<u>t-test</u>	<u>M</u>	<u>SD</u>	<u>t-test</u>

<i>Age (years)</i>	14.12	1.30	14.48	1.35	8.42***	14.36	1.34	7.89***
<i>Acculturation</i>	37.59	8.47	37.45	8.29	0.64 (ns)	37.72	8.20	0.84 (ns)

Note: Frequencies for each variable do not add up to the total sample size because of missing responses. Statistical tests were performed to compare substance users and non-users on all of the variables.

*p< .05, **p< .01, ***p< .0001. ns= nonsignificant.

Appendix B

Table 2. Direct associations of family functioning and self-image, and demographic covariates with substance use

	Lifetime smoking				Past year alcohol use			
	<u>AOR¹</u>	95% CI	<u>AOR²</u>	95% CI	<u>AOR¹</u>	95% CI	<u>AOR²</u>	95% CI
Family functioning	0.44***	0.37- 0.52	0.53***	0.43- 0.65	0.49***	0.42- 0.59	0.59***	0.48- 0.72
Self-image	0.48***	0.38- 0.60	0.59***	0.45- 0.76	0.51***	0.41- 0.63	0.64**	0.50- 0.83
<i>Covariates</i>								
Male (vs. female)	1.16	0.94- 1.43	1.19	0.94- 1.51	0.76**	0.62- 0.93	0.73**	0.58- 0.92
High school (vs. middle school)	1.49*	1.09- 2.03	0.76	0.48- 1.19	1.27	0.99- 1.65	0.55**	0.37- 0.82
Parents rent home	1.22	0.98- 1.52	1.19	0.93- 1.52	0.96	0.78- 1.19	0.91	0.72- 1.15
Live w/ both parents	0.66***	0.53- 0.81	0.75*	0.58- 0.96	0.79*	0.64- 0.97	0.90	0.71- 1.15
Parents' smoking	1.88***	1.50- 2.34	1.74***	1.36- 2.23	1.88***	1.51- 2.34	1.74***	1.37- 2.22
Friends' smoking	3.95***	3.16- 4.94	3.59***	2.83- 4.57	3.51***	2.81- 4.39	3.42***	2.69- 4.36
Age	1.32***	1.20-	1.33***	1.17-	1.29***	1.19-	1.44***	1.26-

		1.44		1.52		1.41		1.65
--	--	------	--	------	--	------	--	------

¹ Odds ratio adjusted for the dependent variable at the school level.

² Odds ratio adjusted for the dependent variable at the school level and other covariates.

*p< .05, **p< .01, ***p< .0001.

Appendix C

Table 3. Preliminary mediational analysis of lifetime smoking and past year alcohol use

	Lifetime smoking		Past year alcohol use	
	β	Effect size	β	Effect size
<u>Step 1:</u> Linear regression of self-image on family functioning	.60***	.56	.60***	.56
	OR	Effect size	OR	Effect size
<u>Step 2:</u> Logistic regression of substance use on self-image	.48***	-.41	.51***	-.37
<u>Step 3a:</u> Logistic regression of substance use on family functioning	.44***	-.45	.49***	-.39
<u>Step 3b:</u> Logistic regression of substance use on family functioning, adjusted for self-image	.47***	-.42	.55***	-.33
	Δ OR ^a		Δ OR ^b	
<u>Step 3c:</u> Difference in odds ratio from Step 3a to Step 3b	.03***		.06***	

Note. Analyses were adjusted for the dependent variable at the school level.

^a-2 log likelihood change = 45.4; p < .0001

^b-2 log likelihood change = 38.7; p < .0001

*p< .05, **p< .01, ***p< .0001.