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Acculturation, Social Self-Control, and Substance Use Among Hispanic Adolescents

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Abstract

It is unclear how acculturation is related to self-control characteristics and whether part of the effect of acculturation on Hispanic adolescents' substance use behavior is mediated through lower self-control. We tested social self-control, peer substance use, and baseline substance use as mediators of the effect of Hispanic (predominantly Mexican or Mexican American) adolescents' level of U.S. acculturation on their substance use behavior 1 year later. In addition, we tested gender as a possible moderator of the pathways involved in the mediation model. Participants included 1,040 self-identified Hispanic/Latino adolescents ($M = 14.7$; $SD = 0.90$; 89% Mexican/Mexican American) recruited from nine public high schools. Acculturation was measured in terms of adolescents' extent of English language use in general, at home, with friends, and their use of the English-language entertainment media. Analyses were conducted using structural equation modeling and controlled for potential confounders such as age and parental education. Results indicated a statistically significant three-path mediation in which poor social self-control and peer substance use mediated the effects of acculturation on prospective substance use. Paths in the mediation model were not found to differ by gender. Our findings suggest that acculturation may influence adolescents' self-control characteristics related to interpersonal functioning, which may in turn influence their affiliation with substance-using friends and substance use behavior. Implications of the findings are discussed in terms of future research and prevention programming.

Keywords

acculturation; social self-control; substance use

Between 2000 and 2010, the Hispanic population in the U.S. rose by 43%, making Hispanics the largest minority group in the country (U.S. Census Bureau, 2010). In the same time period, among Hispanic adolescents 12 to 17 years of age, cigarette or alcohol use showed only a modest decrease whereas marijuana use increased by approximately 2% (SAMHSA, 2011). The U.S. Census (2010) considers people of Hispanic origin to be a nonracial demographic category composed of individuals of Hispanic, Latino, or Spanish origin that may be further classified as Mexican (e.g., Mexican American, Chicano), Puerto Rican, Cuban, or of another Hispanic, Latino, or Spanish origin (e.g., Spaniard, South or Central American). Thus the Hispanic/Latino population in the U.S. is heterogeneous.

The majority of the Hispanic population in the U.S. (i.e., 63%) is represented by individuals of Mexican origin (the remaining include 9% Puerto Rican, 4% Cuban, and 24% Other; U.S. Census Bureau, 2010). Research shows that compared to adolescents in Mexico, Mexican-origin adolescents in the U.S. are more at risk for early substance use initiation and higher illicit drug use (Félix-Ortiz, Villatoro-Velazquez, Medina-Mora, & Newcomb, 2001). Further, U.S.-born Hispanic adolescents with immigrant parents (i.e., second-generation youth) are more at risk for substance use than foreign-born Hispanic adolescents (Peña et al., 2008). Research among Hispanics in the U.S., including those of Mexican origin, shows that greater acculturation to the mainstream U.S. culture is associated with greater likelihood of engagement in risky health behaviors, including substance use (Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005).

Acculturation and Substance Use

Broadly defined, acculturation is a process by which an immigrant group of people adapt to the host culture. Acculturation involves a variety of lifestyle and attitudinal changes that may directly or indirectly affect behavior. In theory and research, acculturation has been commonly operationalized using a unidimensional or a bidimensional model (Unger, Ritt-Olson, Wagner, Soto, & Baezconde-Garbanati, 2007). The unidimensional model operationalizes acculturation as individuals' cultural orientation toward their culture of origin or the host culture on a continuum of lifestyle preferences (e.g., language use, food, entertainment media) extending between the culture of origin and the host culture. The bidimensional model involves taking separate accounts of individuals' orientation toward their culture of origin and toward the host culture, often using two separate scales. An example of the bidimensional model is Berry's (1980, 2005) model of acculturation which categorizes individuals into the following distinct categories of acculturation based on both their orientation toward their culture of origin and the host culture: *assimilation* (i.e., adoption of host culture, rejection of culture of origin), *separation* (i.e., rejection of host culture, retention of culture of origin), *integration* (adoption of host culture and retention of culture of origin), and *marginalization* (i.e., rejection of both cultures) (Berry, 1980, 2005).

There appears to be no single best approach or measure to assess acculturation (Rudmin, 2003; Unger et al., 2007; Thomson & Hoffman-Goetz, 2009; Nieri, Lee, Kulis, & Marsiglia, 2011). Acculturation has been widely studied in health behavior research based on individuals' preferred language of use in various every-day contexts (Unger et al., 2007; Thomson & Hoffman-Goetz, 2009). Among Hispanic adolescents of various origins, including Mexican, brief measures of linguistic acculturation have been found to explain relatively large proportions of the variance in other indicators of acculturation such as parental acculturation, social network characteristics, and perceived ethnic identity (Epstein, Botvin, Dusenbury, & Diaz, 1996; Serrano & Anderson, 2003; Coronado, Thompson, McLerran, Schwartz, & Koepsell, 2005). Unger et al. (2007) compared a unidimensional language use measure of acculturation and three relatively comprehensive bidimensional measures of acculturation and found that the linguistic acculturation scale was significantly correlated with both the U.S. and the Hispanic orientation scales of the bidimensional measures (Unger et al., 2007) such that greater preference for Spanish language was positively correlated with Hispanic orientation and negatively with U.S. orientation. Moreover, linguistic acculturation was the only scale that showed statistically significant correlations with all other measures. Thus the brief unidimensional measures of linguistic acculturation appear to represent a simple but valid means of assessing acculturation (Ebin et al., 2001; Samaniego & Gonzales, 1999; Epstein, Dusenbury, Botvin, & Diaz, 1996; Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987). More importantly, such brief measures have been found to predict a wide range of health risk behaviors among Hispanic adolescents, including substance use, with greater English language use related to higher cigarette, alcohol, and illicit drug use (Epstein, Dusenbury, Botvin, & Diaz, 1996; Epstein, Botvin, & Diaz, 1998, 2001; Unger et al., 2000; McQueen, Getz, & Bray, 2003; Myers et al., 2009).

Among Mexican-origin adolescents in particular, studies using linguistic acculturation measures have found perceived social norms and peer influence to mediate the effects of higher U.S. acculturation on adolescent substance use (e.g., Myers et al., 2009; Allen et al., 2008; Unger et al., 2000; Samaniego & Gonzales, 1999). Hispanic adolescents with better English language skills may mingle more easily with, and be subsequently influenced by, mainstream U.S. youths who show higher prevalence of cigarette, alcohol, and other drug use (SAMHSA, 2011; Myers et al., 2009; Unger et al., 2000). Adolescent substance use is more normative within the mainstream U.S. culture and more acculturated Hispanic youths tend to report lower perceived risks associated with substance use and seem less able to resist peer pressure and other forms of prodrug social influences (Unger et al., 2000; Castro, Stein, & Bentler, 2009). In addition, studies suggest associations between greater U.S. acculturation and higher levels of intrapersonal risk factors for substance use such as rebelliousness, sensation seeking, and deviance tolerance (e.g., favorable attitudes to antisocial behavior and substance use) (Wall, Power, & Arbona, 1993; Saint-Jean, 2010). More acculturated adolescents seem prone to getting into conflicts with family members and peers (Samaniego & Gonzales, 1999; McQueen et al., 2003; Gonzales, Deardoff, Formoso, Barr, & Barrera, 2006; Dinh, Roosa, Tein, & Lopez, 2002). Thus, acculturation may be related to adolescents' attitudes and behavioral dispositions that may expose them to psychosocial risk factors of substance use such as affiliation with deviant peers.

As a cultural process that influences attitudes and behaviors, acculturation is relevant not only to first-generation but also later-generation immigrant youths. For example, acculturation may remain an important process in the lives of later-generation Mexican immigrants who reside in Mexican-heritage enclaves, areas that host large concentrations of Mexican immigrants (Schwartz, Unger, Zamboanga, & Szapocznik, 2010). In most such enclaves the heritage culture is largely preserved. The first-generation immigrants who migrate into such enclaves may have only limited interaction with the mainstream society. They may continue working and living among their community members without learning much English or going to schools or colleges (Schwartz, Pantin, Sullivan, Prado, & Szapocznik, 2006). The children born to these first-generation immigrants are essentially born into an environment where the dominant culture is the Mexican-heritage culture, which continues to shape their attitudes and behaviors. However, compared to their parents, they are more likely to interact with the mainstream society because of the early exposure to the mainstream society via channels such as school, peers, and media. Thus the acculturative process is likely to be very much active in the lives of youths born and raised in the U.S. but in communities where the culture of their parents' or grandparents' place of origin is dominant. Previous research consistently shows that U.S.-oriented acculturation is a significant risk factor for substance use among Hispanic adolescents born in the U.S (Lara et al., 2005; Unger, 2012).

Acculturation, Social Self-Control, and Substance Use

Thus far, no study has tested self-control variables as mediators of the effects of acculturation on Hispanic adolescents' substance use behavior. Social self-control, in particular, may act as such a mediator. Social self-control represents self-regulation in social situations or interpersonal interactions (Sussman, McCuller, & Dent, 2003). Poor social self-control can be understood as a form of behavioral undercontrol manifested during social interactions. Better self-regulation is integral to prosocial interpersonal functioning (Vohs & Ciarocco, 2004), as suggested by research that shows that individuals higher in social orientation perform better on self-regulation tasks (Seeley & Gardner, 2003).

Previous studies have found that lack of social self-control is associated with higher levels of substance use (i.e., cigarette, alcohol, marijuana, and hard drugs use) in both cross-sectional and longitudinal studies involving diverse samples of adolescents (Sussman et al., 2003; Pokhrel, Sussman, Rohrbach, & Sun, 2007; Pokhrel, Sussman, Sun, Kniazar, & Masagutov, 2010; Pokhrel, Sussman, & Stacy, in press). Adolescents lacking social self-control are at increased risk for substance use because they may be more likely to associate with deviant peers who may be inclined to tolerate provocative behaviors and are also likely to drink, smoke, and use drugs (Sussman, Pokhrel, Brown, & Ashmore, 2007). Although peer affiliation has not been previously tested as a mediator of the effect of social self-control on adolescent substance use, Wills and colleagues (Wills et al., 2001; Wills, Resko, Anette, & Mendoza, 2004) have shown that adolescents with poorer generalized self-control tend to associate with deviant peers.

An influence of greater U.S. acculturation on the development of poor social self-control is plausible among Hispanic youth. Children's and adolescents' emerging self-control abilities

tend to develop based on an interplay between early temperamental characteristics (e.g., positive/negative emotionality) and socialization (e.g., learning from interactions with parents and peers) (Wills & Dishion, 2004). Socialization, especially in family, peer, or school context, is largely a cultural process, guided by the culture dominant in each domain (Arnett, 1995). Socialization within an individualistic cultural context tends to promote independence, individualism, and self-expression (Arnett, 1995). But socialization within a collectivistic context tends to promote obedience, conformity, politeness, and normative behaviors that are acceptable to the in-group (e.g., family) (Triandis, 2001; Arnett, 1995; Mills & Clark, 1982). Traditional Hispanic cultures are known for their strong collectivistic orientation (Sabogal, Marin et al., 1987; Murillo, 1971) and thus are conducive to the development of social self-control.

Further, Triandis, Marin, Lisansky, and Betancourt (1984) have argued about the existence of a cultural script (i.e., a pattern of social interaction) among traditional Hispanics, termed *simpatía*, which is likely to promote social self-control. *Simpatía* refers to a personal quality connoting conformity, empathy, respectful behavior, and mode of social interaction that encourages harmony in interpersonal relationships and discourages conflicts (Triandis et al., 1984). Use of Spanish as a language of choice may facilitate adherence to *simpatía* values in interpersonal communication and behavior. In particular, use of Spanish with elders in the family or community may help transmit *simpatía* values from one generation to another. That is, in the Hispanic context, linguistic acculturation in itself, not only as a proxy for general acculturation, may influence youth's social self-control development.

Gender Differences

The relationships among acculturation, social self-control, and substance use may differ by gender for Hispanic youth because conspicuous gender norms and roles exist across traditional Hispanic cultures where males and females are oriented to follow the codes of *machismo* and *marianismo*, respectively (Staples & Mirande, 1980). *Machismo* is associated with aggressiveness, patriarchy, and chauvinism, whereas *marianismo* is characterized in terms of self-sacrifice, submissiveness, warmth, kindness, and characteristics that are commonly linked with collectivistic orientation (Stevens, 1973). Hispanic girls with lower U.S. acculturation may report higher social self-control compared with similarly acculturated boys. Previous research has associated greater U.S. acculturation with more egalitarian gender role attitudes among Hispanics; for example, more acculturated girls are less likely to live by *marianismo* norms (e.g., Wahl & Eitle, 2010; Bethel & Schenker, 2005; Epstein et al., 1998; Marin, Perez-Stable, & Marin, 1989). Thus, one may expect greater U.S. acculturation to relate more strongly to lower social self-control among Hispanic girls than boys. Further, *machismo* and *marianismo* values are believed to encourage and discourage substance use among Hispanic boys and girls in traditional societies, respectively (Unger et al., 2002). Because female substance use may be less stigmatized in the mainstream U.S. culture, more acculturated girls are likely to show higher levels of substance use (Epstein et al., 1998; Marin et al., 1989). Still, the moderating role of gender in the relationship between acculturation and substance use among Hispanic youth is not well understood.

The Present Study

The present study uses structural equation modeling (SEM) to test a mediation model involving linguistic acculturation (i.e., English language use), social self-control, affiliation with substance-using peers (i.e., peer substance use), and substance use in a sample of Hispanic, predominantly Mexican/Mexican American, high school students who were surveyed at two time-points 1-year apart. In addition, using multiple group analysis in SEM, we test possible moderating effects of gender on pathways involved in the mediation model. Specifically, we test the following hypotheses: 1) greater U.S. acculturation is associated with higher follow-up substance use 1 year later through pathways mediated by poor social self-control, greater affiliation with substance-using peers, and higher baseline substance use; 2) poorer social self-control is associated with higher substance use 1 year later through greater affiliation with substance-using peers and higher baseline substance use; 3) the relationships between acculturation and substance use, between acculturation and social self-control, and between acculturation and peer substance use vary by gender, such that the relationships are stronger for females compared to males.

Method

This study is based on self-identified Hispanic adolescents attending “regular” or mainstream public high schools who participated in a trial of Project Toward No Drug Abuse (TND), a nationally recognized evidence-based substance use prevention program that targets high-school-aged youth (Sussman, Dent, & Stacy, 2002). The trial is described in detail elsewhere (Sun, Sussman, Dent, & Rohrbach, 2008). Briefly, the primary aim of the study was to examine the relative effectiveness of two curricula representing two different theory-based components of Project TND, namely “cognitive misperception correction” and “behavioral skills instruction” components. A secondary aim was to determine whether the effects of the two curricula differed significantly across regular high schools (RHSs) and alternative or “continuation” high schools (CHSs) in Southern California. The cognitive component included six sessions that aimed to correct adolescents’ misperceptions regarding substance use (e.g., by challenging pro-substance-use norms and myths). The behavioral component included six sessions that aimed to enhance active listening, communication skills, self-control, and smoking cessation strategies.

Procedure

Nine school districts from two counties were recruited for participation. From each district a pair of high schools, one RHS and one CHS was included, yielding a total sample of 18 schools (nine RHSs and nine CHSs). With school district as the randomization unit, schools were randomly assigned to one of three experimental conditions: cognitive perception information only curriculum (Cognitive Only), combined cognitive perception information plus behavioral skills curriculum (Combined), or standard care (Control); resulting in a sample of six schools per condition (three RHSs and three CHSs).

The study protocol was approved by the University of Southern California Institutional Review Board (IRB). Students were required to obtain parental consent and provide written assent before they were allowed to participate in the study. The informed consent procedure

was implemented approximately 3 weeks before the baseline data collection. Baseline data were collected using a standardized, self-report, close-ended response, written questionnaire which was administered over one class period by trained data collectors. After approximately 1 year of completing the baseline survey, students were approached again in the classroom to collect follow-up data. Those absent from the classroom on testing days were left absentee packets containing the questionnaire and instructions. At the 1-year follow-up, students who failed to return the absentee survey were contacted by telephone for survey administration.

Participants

Survey at baseline was completed by 1,902 RHS students and 832 CHS students. Participation rate across schools was 70% of the enrollment roster, which is typical for prevention trials conducted in California high schools (Sussman et al., 2002). Because of the concern for generalizability of findings, the present study is based only on the RHS subsample. CHS students represent high-risk youths and differ significantly from RHS students on several variables, including substance use, socioeconomic status (SES), and gender (Sussman et al., 2002). Hence, findings based on CHS students may not generalize to the majority of Hispanic adolescents (Mexican-heritage or other) in the U.S. that attend mainstream high schools. In addition, the rate of subject attrition at follow-up for CHS students in the trial was much higher compared to RHS students (37% vs. 19%), which in our view made the CHS sample more susceptible to bias.

The sample for the present study is comprised of $N = 1,040$ RHS students (n girls = 537; n boys = 503) who identified themselves as Hispanic/Latino at baseline (i.e., approximately 54% of the total baseline RHS sample). The demographic and substance use prevalence characteristics of the participants are presented in Table 1. The majority of the participants, 89%, reported to be Mexican or Mexican American. The remaining identified themselves as South American (3.4%), Central American (4.6%), or Other Hispanic/Latino (3.0%). Previous studies conducted in the same population (Unger, Ritt-Olson, Soto, & Baezconde-Garbanati, 2009; Unger et al., 2007) suggest that the majority of the present participants (approximately 70%) are likely to have represented second-generation immigrant youth. The likelihood that the majority of our participants were second-generation immigrants is also supported by their relatively high mean U.S. acculturation level.

It should be noted that the present sample represented participants from all three arms of the prevention trial. Twenty-six percent of the sample belonged to the Cognitive Only condition, 42.5% to the Combined condition, and 31.5% to the Standard Care Control condition. The participants in the Combined condition received one 40-min session on self-control, parts of which included materials on social self-control training (e.g., matching social skills with social contexts). Using Tukey's honestly significant difference (HSD) test, we compared students across the three program conditions on social self-control and acculturation at pretest, immediate posttest, and 1-year follow-up; no statistically significant differences were found, $p > .10$. However, to account for potential effects of treatment conditions on study variables, we treated the study conditions as covariates in all longitudinal analyses.

Attrition Analysis and Missing Data Estimation

Of the 1,040 baseline participants only 846 participated in the follow-up survey, resulting in an attrition rate of 19% (i.e., retention rate of 81%) at follow-up. In order to determine the baseline characteristics of participants who were lost to follow-up, we compared participants who were retained at follow-up ($n = 846$) with those lost to follow-up ($n = 194$) on baseline measures of all study variables: age, gender, parental education, acculturation, social self-control, peer substance use, and past-30-day cigarette, alcohol, marijuana, and hard drug use. We used t test and chi-square test to determine significant differences between the two groups ($p < .05$, two-tailed). We found that compared to retained students, the lost-to-follow-up students were slightly older, $M = 0.13$ years, $SE = 0.07$, $p = .05$, and represented significantly more males, 55% versus 47%, $p = .03$. In addition, the lost-to-follow-up students tended to report significantly higher past-30-day alcohol, 20% versus 14%, $p = .03$, and marijuana use, 43% versus 33%, $p = .008$, at baseline. The two groups did not differ significantly in terms of parental education, linguistic acculturation, social self-control, peer substance use, and past-30-day cigarette or hard drug use. Given that significant differences were noticed for marijuana and alcohol use, in order to minimize the potential bias in findings due to participant attrition, during hypotheses testing missing data were estimated for the lost-to-follow-up participants for follow-up substance use using MLR estimator, which is a maximum likelihood estimator in Mplus (Version 6; Muthén & Muthén, 1998–2010) that is robust to non-normality.

Measures

Demographics—Single items were used to identify participants' age, gender, and ethnicity. The ethnicity item asked: "What is your ethnic background?" From a list, participants chose the one ethnic category that best applied to them: Black or African American, Asian and Pacific Islander, Hispanic/Latino (including Mexican American, Mexican, Central American, South American), White/Non-Latino, American Indian, and Other Ethnicity. Space for open-ended response was provided for the "Other Ethnicity" option. Parental education was measured separately for each parent as the highest level of education attained, using a 6-point scale that ranged from *Not completed elementary school (8th grade)* to *Completed graduate school (Doctor, Lawyer)* (Hollingshead & Redlich, 1958). This type of parental education measure has been used as a proxy for socioeconomic status in previous studies and is known to be a robust predictor of adolescent substance use (e.g., Wills, McNamara, & Vaccaro, 1995). For present analyses, parental education corresponded to the highest educational attainment between father and mother.

Acculturation—Acculturation was measured in terms of English language use pattern, using four items adapted from Marin et al. (1987): "In general, what language(s) do you most often read and speak?"; "What language(s) do you usually speak with your friends?"; "In what language(s) are the movies, TV and radio shows you like to watch and listen to?"; "What language(s) do you usually speak at home?" Each item was scored on a 5-point scale: 1) *Only English*; 2) *English more than another language*; 3) *English and another language equally*; 4) *another language more than English*; and 5) *Only another language (not English)*. Because the present sample consists predominantly of Mexicans/Mexican Americans, "another language" is presumed to be Spanish. For Mexicans/Mexican

Americans living in Southern California, English and Spanish are alternative languages. “Another language” was used in the response options instead of “Spanish” because the survey was administered to a multiethnic sample of adolescents. Single-item and multiitem linguistic acculturation have shown robust construct as well as substance use predictive validity among Hispanic youths (Epstein, Botvin, Dusenbury, & Diaz, 1998; Unger et al., 2000). In the current sample, the four items showed a good internal consistency (Cronbach’s alpha = .82). For descriptive analyses, the score for each item was reversed and a linguistic acculturation index was created by summing scores across the four items.

Social self-control—Ten items measured social self-control. These items were developed in the course of program development work, in order to assess adolescents’ tendency to act in an unrestrained way in social contexts, with peers and adults (Sussman et al., 2003). Each item was scored on a 4-point scale: 1) *Always*; 2) *Usually*; 3) *Sometimes*; and 4) *Never*. Example items include: “I enjoy arguing with people”; “If I am angry I act like it”; “My mouth gets me in trouble a lot”; and “Sometimes I provoke people just for the fun of it” (Cronbach’s alpha = .76). For descriptive analyses, a social self-control index was created by summing scores across the 10 items.

Peer substance use—Peer substance use was assessed with the question “In the last month (last 30 days), how many of your 5 closest friends have used each of the drugs below?” Responses were measured separately for cigarette, alcohol, marijuana, and hard drug use on a 6-point scale ranging from *0 Friends* to *5 Friends*. The following examples were provided for “Hard drugs”: Cocaine (crack), Hallucinogens (LSD, Acid, Mushrooms), Stimulants (Ice, Speed, Amphetamines), Inhalants (Rush, Nitrous, Glue), Ecstasy (MDMA, XTC, Adam), Other (Depressants, PCP, Steroids, Heroin, etc.). Peer use for the four substance use types had good internal consistency (Cronbach’s alpha = .83). For analyses, a “peer substance use” score was created by summing scores across the four substance types.

Substance use—Past 30-day cigarette, alcohol, marijuana, and hard drug use were measured with the lead-in question “In the last month (last 30 days), how many times have you used each of the drugs below?” Multiple “hard” drugs were measured, as indicated above. For each substance type, use frequency was measured on an 8-point scale: *0 times*, *1–10 times*, *11–30 times*, *31–50 times*, *51–70 times*, *71–90 times*, *91–100 times*, and *More than 100 times*. For analysis purposes, a hard drug use score was created by summing across the past 30-day use frequency for each hard drug measured (Cronbach’s alpha = .84). The drug use questionnaire items are the type used in the Monitoring the Future studies (Johnston, O’Malley, Bachman, & Schulenberg, 2011) and other previous research, all of which have shown supporting evidence of adequate test–retest reliability and/or internal consistency (Graham et al., 1984; Needle, McCubbin, Lorence, & Hochhauser, 1983; Stacy et al., 1990; Sussman, Dent, Burton, Stacy, & Flay, 1995).

Statistical Analyses

Descriptive analyses were performed in SAS (Version 9.1). We conducted *t*- and chi-square tests to determine gender differences in the study variables, including baseline and follow-up substance use. In addition, correlations among study variables were examined separately by

gender. Hypotheses were tested using SEM in Mplus (Version 6.1; Muthén & Muthén, 1998–2010). Two steps led to hypotheses testing.

First, confirmatory analyses were performed on the entire sample to establish a measurement model comprising the following latent variables: linguistic acculturation, social self-control, peer substance use, baseline substance use, and follow-up substance use. The 10 social self-control items were used as indicators of the social self-control construct. Linguistic acculturation was indicated by the four acculturation (language use) items. Peer substance use was indicated by peer cigarette, alcohol, marijuana, and hard drug use. Baseline and follow-up substance use were indicated by baseline and follow-up cigarette, alcohol, marijuana, and hard drug use, respectively. Only the indicators that showed salient factor loadings (i.e., standardized factor loadings >0.35 ; Brown, 2006) were retained in the measurement model. The latent variables were allowed to covary. Because the distributions for substance use variables were highly skewed, the variables were log-transformed to reduce skewness. However, despite the log-transformation, skewness still remained. Hence, the measurement model was estimated using the MLR estimator option in Mplus, which is robust to multivariate non-normality (MLR; Muthén & Muthén, 1998–2010).

Second, the measurement model was tested for invariance across genders using multiple group analysis, which included testing factor loadings, intercepts, and residual variances for equivalence across genders. The Satorra-Bentler scaled chi-square difference test was used to perform nested model comparisons and determine whether placing equality constraints across gender on factor loadings, intercept, or residual variances significantly worsened the fit of the model compared to the base model in which the parameters were estimated freely for each gender. Specifically, measurement invariance was evaluated in the following sequence of steps (Brown, 2006): (1) simultaneous test of equality of form (identical factor structure); (2) test of equality of factor loadings; (3) test of equality of indicator intercepts; and (4) test of equality of indicator residual variances.

Next, mediational hypotheses were tested. The latent variable representing baseline linguistic acculturation and age, female gender, and parental education were specified as exogenous variables. In addition, treatment conditions pertaining to the prevention trial were included as covariates (treatment conditions were dummy coded with control group as the reference group). The latent variables representing baseline social self-control, baseline peer substance use, and baseline substance use were specified as mediators; and the latent construct representing follow-up substance use was specified as the criterion variable. In the model, social self-control preceded baseline and peer substance use. That is, peer substance use and baseline substance use were assumed to be more proximal predictors of follow-up substance use compared to poor social self-control. Note that the present SEM analyses were based on two waves of data and utilized data collected at the same time-point (i.e., baseline) for both exogenous (predictor) and mediator variables. Hence the temporal sequence in the model was based on theoretical assumptions.

The final mediation model was established as follows. First, paths were specified from each exogenous variable to each mediator variable and the criterion variable and from each mediator variable to the criterion variable. No path was specified between peer substance

use and baseline substance use; rather, the two variables were specified to covary. All exogenous variables were specified to covary with each other. Thus, in the first step, a structural model was run with all possible direct paths in the model specified. In the second step, the structural model was estimated again but with only those paths included in the model that showed statistically significant ($p < .05$) path coefficients in the previous step. The goodness of model fit was determined based on chi-square statistic as well as the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA). Mediation was determined based on statistically significant ($p < .05$) specific indirect effects, which were computed using Mplus (Muthén & Muthén, 1998–2010). We used the bootstrap method to estimate standard errors of the indirect effects and their 95% confidence intervals.

Next, in a series of steps, possible moderation of path effects by gender was tested using multiple-group comparisons across genders. First, a model was estimated for the entire sample following the steps used to establish the previous structural model but excluding gender as an exogenous variable. Second, the configural model was tested simultaneously across genders for equal form. In this model, paths were estimated freely for each gender. Third, a fully constrained model was estimated in which all structural paths and covariances were held equal across gender. The Satorra-Bentler scaled chi-square difference test (Satorra & Bentler, 2001) was used to compare the constrained model with the free model. Lastly, we tested each path individually for invariance across genders.

Results

Descriptive Statistics

Table 1 shows the means and standard deviations for continuous study variables, along with proportions of adolescents who reported any use of cigarette, alcohol, marijuana, or hard drugs in the past 30 days at baseline and follow-up, differentiated by gender. On average, boys reported significantly higher linguistic acculturation and social self-control. No gender difference was found for parental education. For both males and females, median parental education was reported as completion of high school. Girls were significantly more likely to have substance-using friends compared to boys at baseline. In addition, significantly more girls at baseline were likely to have used alcohol in the past 30 days compared to boys. No significant difference was found between boys and girls in past 30-day cigarette, marijuana, and hard drug use at baseline. At follow-up, boys were significantly more likely to report past 30-day marijuana use compared to girls; gender differences were not statistically significant for other substances.

Table 2 shows the zero-order correlations among study variables, separately for boys and girls. For boys, age correlated inversely with U.S. acculturation and positively with peer substance use and past 30-day cigarette use at baseline. These correlations were not statistically significant for girls. For both boys and girls, higher parental education correlated significantly with greater U.S. acculturation. In both boys and girls, greater U.S. acculturation correlated significantly with lower social self-control and higher peer substance use. In addition, greater U.S. acculturation was significantly and positively correlated with all substance use variables in boys except for alcohol and hard drug use at

follow-up. For girls, acculturation was significantly and positively correlated with cigarette and marijuana use at baseline, and alcohol and marijuana use at follow-up. Across both genders, lower social self-control was significantly correlated with greater peer substance use. Among girls, lower social self-control was significantly correlated with higher substance use at baseline and follow-up. Among boys, lower social self-control was significantly correlated with higher cigarette and alcohol use at baseline, and higher cigarette, alcohol, marijuana, and hard drug use at follow-up. For both genders, peer substance use correlated strongly and significantly with past-month use of cigarette, alcohol, marijuana, and hard drugs at both time points. In general, cigarette, alcohol, marijuana, and hard drug use significantly correlated with each other across genders.

Measurement Model

The measurement model comprised of five latent variables: linguistic acculturation, social self-control, peer substance use, baseline substance use, and follow-up substance use. All four language-usage items loaded strongly on the acculturation factor, standardized factor loading (λ) $> .50$, $p < .001$. Two of the 10 social self-control items showed relatively weak factor loadings, $\lambda < .35$, $p < .001$. These two items were: “I express all my feelings” and “My feelings get hurt easily.” The factor loadings for the remaining eight social self-control items were salient, $\lambda > .45$, $p < .001$. The indicators for peer substance use, baseline substance use, and follow-up substance use, all loaded strongly on their respective factors, $\lambda > .50$, $p < .001$. The final measurement model that excluded the two social self-control items showed a good fit to the data, $\chi^2 = 412$, $df = 234$, CFI = .96, RMSEA = .027, 90% CI [.023, .031]. Table 3 shows the standardized factor loadings for all indicators retained in the final measurement model.

Invariance of Measurement Model Across Gender

The measurement model showed a good fit when estimated simultaneously across gender to test for equal form, $\chi^2 = 743$, $df = 470$, CFI = .95, RMSEA = .033, 90% CI [.029, .038]. Parameters in this model, including factor loadings, indicator intercepts, and error variances, were estimated freely across the genders. In order to test invariance in factor loadings, a model with factor loadings constrained to be equal across genders was compared against the base model. The Satorra-Bentler scaled chi-square difference test indicated that placing equality constraints on factor loadings did not significantly worsen the model fit, $\chi^2 = 15.3$, $df = 19$, $p = .70$. Next, equality constraints were placed on indicator intercepts and the constrained model was compared against the free model. The constrained model was found to significantly worsen the model fit, $\chi^2 = 122$, $df = 19$, $p < .001$. The model modification indices for indicator intercepts were consulted in order to decide which indicators were to be released from equality constraints (Byrne, 2012). Consequently, further nested model comparisons were made after releasing the equality constraints that significantly deteriorated the model fit. Equality constraints were removed from two acculturation items and four social self-control items before the constrained model showed no significant difference compared with the free model, $\chi^2 = 16.9$, $df = 13$, $p = .20$. Table 3 shows the indicators for which the intercepts were noninvariant across genders.

Next, equality constraints were placed on error variances and the constrained model was compared with the free model. The constrained model was found to significantly worsen the model fit, $\chi^2 = 47.21$, $df = 24$, $p < .01$. Guided by the modification indices, equality constraints were released from error variances pertaining to follow-up marijuana use and hard drug use. The resulting model did not significantly deteriorate the fit of the base model, $\chi^2 = 32.4$, $df = 22$, $p = .07$. Thus, although all factor loadings were invariant across genders, some indicator intercepts and indicator error variances differed across genders. This partially invariant model was used in the multiple-group analysis conducted to test moderation by gender.

Structural Model and Mediation

Figure 1 represents the results of the SEM analyses that tested the mediation hypotheses. The final model, as depicted in Figure 1, showed a good fit to the data, $\chi^2 = 544$, $df = 294$, CFI = .95, RMSEA = .029, 90% CI [.025, .032]. Linguistic acculturation was found to have direct paths to social self-control, baseline substance use, and peer substance use. Social self-control showed direct paths to baseline substance use and peer substance use. Peer substance use and baseline substance use had paths to follow-up substance use. Older age was related to greater peer substance use and greater baseline substance use. Being female was related to lower social self-control and lower follow-up substance use. Parental education showed no effect on any of the mediators or the criterion variable.

Linguistic acculturation had a statistically significant three-path indirect effect on follow-up substance use, through lower social self-control and greater peer substance use, indirect effect (IE) = .013, $SE = 0.006$, 95% CI [.005, .027], $p < .05$. Another marginally significant two-path indirect effect of acculturation on follow-up substance use was found through peer substance use, IE = .020, $SE = 0.01$, 95% CI [.009, .048], $p = .05$. Baseline substance use did not mediate the effect of either acculturation or social self-control on follow-up substance use. Peer substance use significantly mediated the effect of social self-control on follow-up substance use, IE = -0.11, $SE = -0.04$, $p < .01$, 95% CI [-0.19, -0.03]. We tested for the possible indirect effect of female gender on follow-up substance use via poor social self-control. The effect was not statistically significant ($p > .05$).

Multiple Group Analysis by Gender

Figure 2 represents the multiple-group configural model that was estimated across both genders simultaneously, with path and covariance parameters estimated freely across groups. The model showed a good fit to the data, $\chi^2 = 835$, $df = 577$, CFI = .95, RMSEA = .029, 90% CI [.025, .034]. Note that Figure 2 provides unstandardized path and covariance coefficients and corresponding standard errors by gender. Invariance of paths and covariances across genders was tested by estimating a model in which all the structural paths and covariances were constrained to be equal across genders. This constrained model did not significantly worsen the fit of the free model, $\chi^2 = 13.8$, $df = 13$, $p > .10$. Additionally, each individual path was tested for noninvariance singly using 1- df nested model comparisons. None of the paths differed significantly across gender, $p > .10$.

Discussion

This study tested hypotheses concerning social self-control, affiliation with substance-using peers, and baseline substance use as mediators of the effect acculturation on Hispanic adolescents' substance use behavior. In addition, we tested for the possible moderating effects of gender on the pathways involved in the mediation model. Our hypotheses were partially supported. We found a statistically significant three-path indirect effect of greater U.S. acculturation (i.e., greater English language use) on higher substance use 1 year later, through lower social self-control and greater affiliation with substance-using peers. However, baseline substance use was not found to mediate the effect of acculturation on follow-up substance use. Our hypothesis that affiliation with substance-using peers would mediate the effect of poor social self-control on future substance use was supported. But we did not find the indirect effect of social self-control on follow-up substance use through baseline substance use to be statistically significant. In addition, our hypotheses concerning gender as a moderator were not supported.

The current literature lacks empirical studies that have tested the relationship between acculturation and self-control variables. Hence, our findings provide a unique contribution to the literature. Our hypothesis regarding the predictive relationship between acculturation and social self-control was based on the assumption that cultural values associated with acculturation affect children's socialization, primarily in family- and peer-related contexts, which in turn affects the development of social self-control during childhood and adolescence (Wills & Dishion, 2004; Arnett, 1995; Berry, 1980). The present study was not designed to test hypotheses related to cultural values, socialization, and the development of social self-control over time. But such hypotheses are worthwhile to pursue in order to determine how acculturation influences Hispanic adolescents' behavioral dispositions that are related to risky behaviors.

However, a better understanding is needed as to what the present findings may mean in the context of the bidimensional models of acculturation. One may extrapolate from the current data that in the bidimensional context, greater U.S. orientation is likely to be related to lower social self-control and greater Hispanic orientation to higher social self-control. In terms of Berry's (1980, 2005) categories, however, the extrapolations may not be this straightforward. Based on their respective orientation, assimilated adolescents and adolescents who have rejected the mainstream U.S. culture may show poorer and higher social self-control, respectively, compared to U.S.-oriented students. Because of their assumed ability to successfully balance the values of both cultures, integrated adolescents may also show higher social self-control compared to U.S.-oriented students. Conversely, marginalized adolescents may show poor social self-control because of their inability to find anchor-age in either culture. Of course, only future research can elucidate the differences and similarities in social self-control among integrated, separated, and marginalized adolescents.

We found a marginally significant two-path indirect effect of acculturation on adolescent substance use through greater peer substance use, which provides further evidence that Hispanic adolescents with greater U.S. acculturation are more likely to affiliate with

substance-using friends. However, the direct effect of acculturation on peer substance use was weaker compared to the effect of acculturation on social self-control and the effect of social self-control on peer substance use. The finding that adolescents lower in social self-control are likely to associate with substance-using peers is consistent with past findings that suggest that poor self-control constructs are related to substance use through proximal substance use risk factors such as deviant peer affiliation (Wills & Dishion, 2004). Although the direct relationship between social self-control and adolescent substance use has been studied in the past (e.g., Pokhrel et al., 2007, 2010), this is the first study that found support for the hypothesis that social self-control may be associated with substance use over follow-up through deviant peer affiliation. Future studies need to examine how initial social self-control may determine patterns of peer selection over time.

We found noninvariance in measurement model across gender in terms of differences in some of the intercepts and error variances. Because the configural model and the factor loadings were equivalent across genders, it can be safely concluded that the study measures held the same meaning across genders and allowed for meaningful between-gender comparisons of the regressive paths linking latent variables (Brown, 2006). Although the gender differences in intercepts pertaining to certain acculturation and social self-control items raise interesting questions related to gender-related differential indicator functioning in these measures (Byrne, 2012), they are not likely to have affected the substantive questions pursued in the present study (Brown, 2006).

We found a weak, albeit statistically significant, direct effect of gender on social self-control suggesting that girls are more likely to score lower on social self-control than boys. In fact, in the present sample, boys on average reported higher social self-control at baseline compared with girls. This is somewhat counterintuitive because boys are generally thought to show higher externalizing type behavior (e.g., Moffitt, Caspi, Rutter, & Silva, 2001; Carlson, Tamm, & Gaub, 1997). However, it should be noted that the Hispanic communities across the U.S. are heterogeneous and the majority of the present sample was comprised of Mexican-origin youth from the Los Angeles area, who are likely to have been exposed to the street gang cultures of the region. The Los Angeles area street gangs have traditionally included both male (*Cholo*) and female (*Chola*) members and are known to encourage violent, defiant, and rebellious behavior among males as well as females (Moore, 1994; Vigil, 2008). The influence of the *Chola* subculture could be one of the factors responsible for poorer average social self-control among girls in the present sample, in that girls may be more inclined to show disinhibited behavior in order to prove that they are “tough” (Moore, 1994).

Our findings should be interpreted in light of the possibility that the majority of our participants represented second-generation Mexican-origin youth. For example, the lack of meaningful gender differences in the effects of acculturation on social self-control, peer use, or substance use may be related to the relatively high level of U.S. acculturation reported by our participants. The average level of U.S. acculturation in our sample is comparable to the average levels of U.S. acculturation reported in previous studies involving predominantly second-generation Mexican-origin youth (e.g., Nieri et al., 2011; Castro et al., 2009; Unger et al., 2009; Gonzales et al., 2006). One of these studies (Castro et al., 2009) that used

multiple-group analysis to test gender differences in the relationship between acculturation and adolescent substance in a model involving cognitive mediators did not find significant gender differences.

Limitations

Because the study is based on secondary data analysis, the acculturation measure used is not ideal. Given that there are multiple ways to conceptualize and operationalize acculturation, including more than one measure of acculturation or including a more nuanced measure that would tap multiple lifestyle characteristics and generational status would have been desirable. Further, only two waves of data were used in the present analyses; multiple waves of data would be preferable to test the structural model we proposed. The exogenous variables and mediators in our model were measured at the same time-point. Thus the present data cannot truly answer questions related to the temporal ordering of variables. Specifically, our finding concerning the relationship between social self-control and peer affiliation should be interpreted with caution because an effect on the reverse direction is also plausible (Meldrum & Hay, 2012).

Two items of the original social self-control that tended to measure internal disposition were excluded from the measurement model of social self-control in the present study. Studies are needed to determine the uniqueness of the new 8-item social self-control measure compared to other indicators of behavioral self-control and dispositional variables such as anger, hostility, and agreeableness which appear to be conceptually similar to social self-control. In a separate sample, we recently found that the 8-item measure of social self-control was distinct compared to sensation seeking and impulsivity (Pokhrel, Sussman, & Stacy, in press) and was predictive of cigarette smoking adjusting for sensation seeking or impulsivity 1 year later among high risk adolescents. Similar studies are needed to establish the distinctness of the social self-control construct. In addition, future studies are needed to determine how acculturation is related to behavioral and emotional dimensions of self-control.

The use of “past 30-day” as a timeframe to measure substance use among adolescents may have been too conservative. Use of a longer timeframe (e.g., 6-month) may have resulted in additional significant path effects or stronger effect sizes. Our findings may not generalize to non-Mexican-origin Hispanic adolescents or Mexican-origin adolescents from regions with less strong Mexican/Mexican American presence. Lastly, we found that compared to the analysis sample, the participants that were lost to follow-up were slightly older, represented more males, and tended to report higher recent alcohol and marijuana use. Although measures were taken to handle the missing data, there is still some possibility that the exclusion of some potentially higher risk adolescents at follow-up affected our results.

Implications for Prevention

Findings of this study may inform future substance use prevention programming targeting Hispanic youth. Reviews of such interventions indicate that in addition to addressing risk/protective factors such as knowledge, social norms, and social influence, most efficacious programs focus on improving family environment (e.g., cohesion) and/or parenting practices

(e.g., parental monitoring, parent-adolescent communication) (Prado, Szapocznik, Maldonado-Molina, Schwartz, & Pantin, 2008; Szapocznik, Prado, Burlew, Williams, & Santisteban, 2007; Castro et al., 2006). Programs such as *Familias Unidas* (Pantin et al., 2003), *Neustras Familias* (Martinez & Eddy, 2005), *Keepin' it REAL* (Marsiglia & Hecht, 2005), and *Family Effectiveness Training* program (FET; Szapocznik et al., 1989) attempt to promote protective factors related to traditional Hispanic values such as familism, respect for elders, and ethnic pride. To some extent, these programs are guided by the assumption that among Hispanic families, acculturation to the U.S. is related to the erosion of traditional collectivistic values and mores (Prado et al., 2008). Castro et al. (2006) suggest that existing models of prevention interventions for Hispanic adolescents would improve if expanded in novel ways to incorporate more cultural variables such as *simpatia* and *confianza* (interpersonal trust and trust worthiness). Our findings suggest that emphasizing social self-control training in prevention models inclusive of traditional prosocial cultural values may further improve the predictive strength of such models. Hence, future program development research is needed to find ways to combine social self-control training strategies with ways of promoting helpful traditional values among Hispanic youth.

Conclusion

In summary, the findings of this study enhance the current understanding of the relationship between acculturation and substance use among Hispanic, primarily Mexican-origin adolescents. This study found that the effects of greater acculturation to the U.S., measured in terms of preference for English language use in everyday context, on the future substance use of Hispanic, predominantly Mexican-origin, youths may be mediated through poorer self-control and affiliation with substance-using peers. This study is one of first to suggest that U.S. acculturation may be associated with the self-control abilities of Hispanic youth. We stress the importance of examining cognitive, behavioral, and emotional self-control constructs as mediators of the effects of acculturation on substance use among Hispanic youths in the future.

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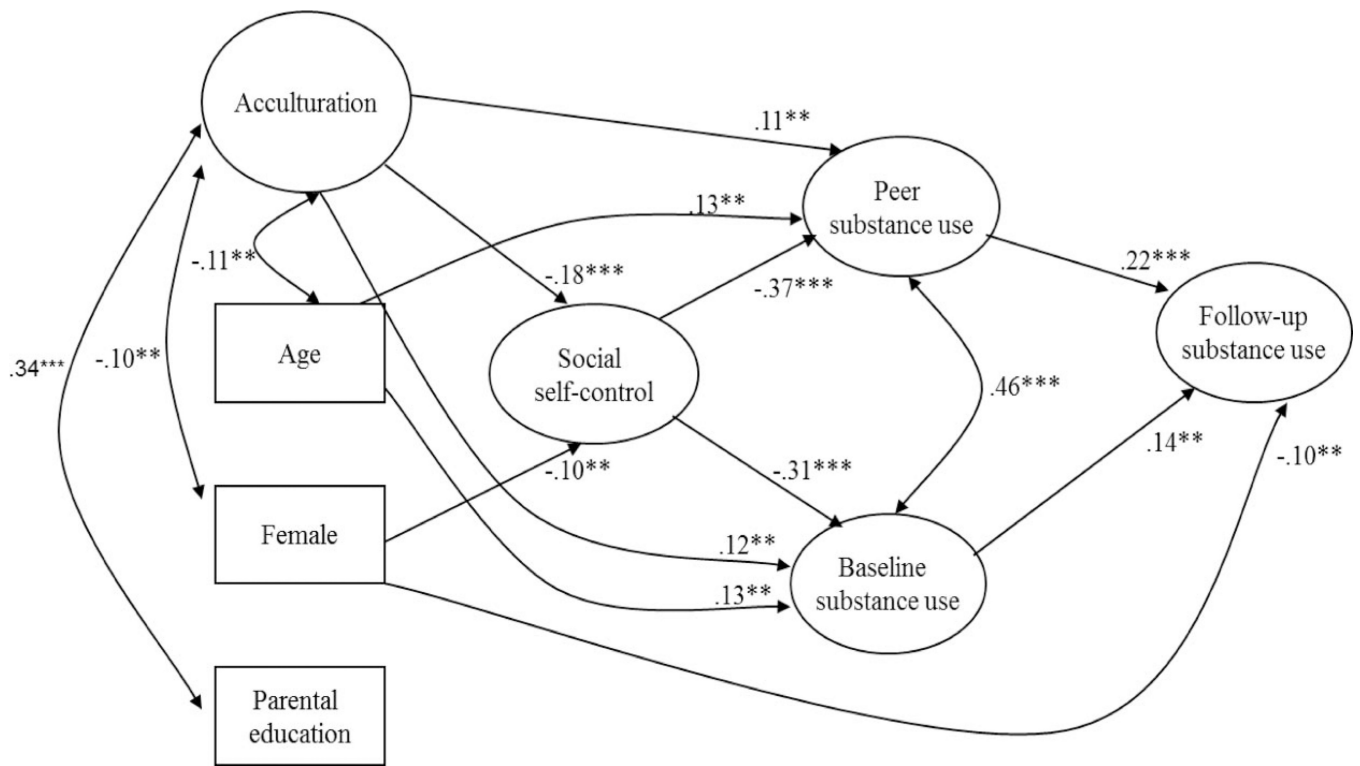


Figure 1. Structural model representing pathways from linguistic acculturation to Hispanic adolescents' past 30-day substance use 1 year later ($N = 1,040$). Single-headed arrows represent regression paths and double-headed curved arrows represent covariances. Values represent standardized coefficients. For clarity, only statistically significant ($p < .05$) paths or covariances are presented. Although the residual variances were computed for all endogenous variables, including factor indicators, for clarity of presentation, they are not shown in the figure. R^2 values for social self-control, peer substance use, baseline substance use, and follow-up substance use were .04 ($p < .01$), .17 ($p < .001$), .13 ($p < .001$), and .11 ($p < .001$), respectively. *** $p < .001$; ** $p < 0.01$.

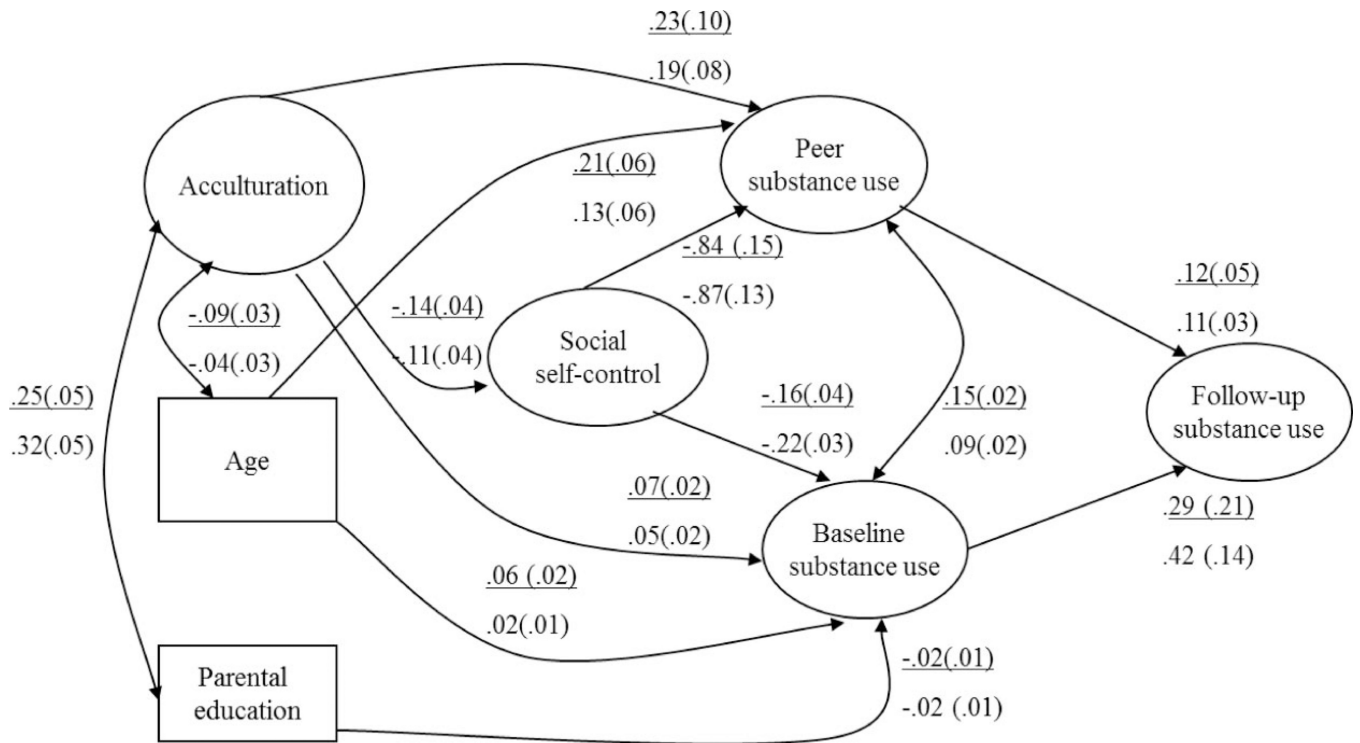


Figure 2. Multiple-group analysis across gender (n Boys = 503; n Girls = 537). Straight arrows indicate regression paths and double-headed curved arrows indicate covariances. Values represent unstandardized coefficients (standard errors in parentheses) for boys (above) and girls (below). Only the paths or covariances that were statistically significant ($p < .05$) are included in the figure. None of the coefficients differed statistically significantly between boys and girls, $p > .05$. Residual variances for all endogenous variables, including factor indicators, were estimated but are not shown in the figure for clarity of presentation.

Table 1

Participant Characteristics

	Baseline (<i>N</i> = 1040)	
	Male (<i>n</i> = 503)	Female (<i>n</i> = 537)
	<i>M</i> (<i>SD</i>)/Frequency	<i>M</i> (<i>SD</i>)/Frequency
Age	14.8 (0.93) _a	14.8 (0.89) _a
Parental education ¹	3.29 (1.34) _a	3.13 (1.34) _a
Acculturation ²	16.0 (3.15) _a	15.5 (3.30) _b
Social self-control ³	29.3 (5.45) _a	28.0 (5.65) _b
Peer substance use ⁴	4.74 (5.55) _a	5.49 (5.60) _b
% Cigarette users	10% _a	8% _a
% Alcohol users	29% _a	36% _b
% Marijuana users	15% _a	15% _a
% Hard drug users	4% _a	5% _a
	Follow-up (<i>N</i> = 846)	
	Male (<i>n</i> = 396)	Female (<i>n</i> = 450)
	Frequency	Frequency
% Cigarette users	15% _a	11% _a
% Alcohol users	38% _a	37% _a
% Marijuana users	18% _a	13% _b
% Hard drug users	7% _a	6% _a

Note. Same-letter subscript across row denotes absence of statistically significant gender difference ($p < .05$) for the corresponding variable. Different-letter subscript across row denotes statistically significant gender difference ($p < .05$). Substance use frequency corresponds to any use in past 30-day.

¹ Coded as 1 = not completed elementary school, 2 = not completed high school, 3 = completed high school, 4 = some college or job training, 5 = completed college, 6 = completed graduate school;

² Higher score indicates greater English language use;

³ Higher score indicates higher social self-control;

⁴ Higher score indicates greater number of peers using cigarettes, alcohol, marijuana, and hard drugs.

Table 2

Zero-Order Correlation Between Main Study Variables

	Age	Parent. Educ.	Accult.	S. self-control	Peer use	Cigarette (T1)	Alcohol (T1)	Marijuana (T1)	Hard (T1)	Cigarette (T2)	Alcohol (T2)	Marijuana (T2)	Hard (T2)
Age	X	-.03	-.03	.02	.08	.06	.03	.05	.006	.06	.03	.02	-.03
Parental Education	-.001	X	.39***	-.09	.06	.07	-.04	-.005	-.05	.002	-.03	.006	.03
Accult.	-.15**	.35***	X	-.10*	.14**	.15**	.08	.09*	.08	.07	.19***	.17**	.08
Social self-control	-.002	-.09	-.11*	X	-.33***	-.17**	-.18***	-.21***	-.17**	-.16**	-.17**	-.19***	-.18**
Peer use	.10*	.16**	.17**	-.25***	X	.28***	.38***	.38***	.19***	.19***	.26***	.27***	.24***
Cigarette (T1)	.13*	.03	.13*	-.15**	.42***	X	.29***	.28***	.32***	.25***	.19***	.17**	.25***
Alcohol (T1)	.06	.02	.10*	-.18**	.37***	.31***	X	.27***	.21***	.14**	.26***	.18**	.16**
Marijuana (T1)	.09	.08	.15***	-.07	.39***	.48***	.35***	X	.30***	.24***	.20***	.37***	.22***
Hard (T1)	.06	.05	.15***	-.03	.27***	.37***	.24***	.30***	X	.10*	.14**	.14**	.35***
Cigarette (T2)	.02	-.02	.16**	-.10*	.31***	.28***	.23***	.13*	.17**	X	.34***	.44***	.41***
Alcohol (T2)	.01	-.04	.08	-.15**	.34***	.16**	.32***	.18**	.22***	.36***	X	.36***	.22***
Marijuana (T2)	.0004	-.03	.16***	-.16**	.31***	.18**	.24***	.24***	.21***	.32***	.42***	X	.42***
Hard (T2)	-.06	-.07	.06	-.14**	.12*	.11*	.17**	.002	.34***	.29***	.29***	.44***	X

Note. N = 1,040 for correlations between baseline variables and N = 846 for correlations involving follow-up variables; Females and males are represented above and below the diagonal, respectively; Accult. = Linguistic acculturation; T1 = Baseline, T2 = Follow-up.

* p < 0.05.

** p < .01.

*** p < .0001.

Table 3

Factor Loadings, Intercepts, and Error Variances for Factor Indicators

Factors	Items	Standardized factor loadings		Intercept (SE)		Error variance (SE)	
		Both genders		Boys	Girls	Boys	Girls
Acculturation	A1	.87		3.86 (0.04)	3.86 (0.04)	0.22 (0.04)	0.22 (0.03)
	A2	.71		4.26 (0.04)	4.18 (0.05)	0.50 (0.04)	0.42 (0.05)
	A3	.55		4.47 (0.04)	4.23 (0.04)	0.50 (0.05)	0.53 (0.04)
	A4	.86		3.37 (0.04)	3.52 (0.06)	0.53 (0.08)	0.37 (0.05)
Social self-control	S1	.59		3.17 (0.04)	3.17 (0.04)	0.56 (0.06)	0.51 (0.04)
	S2	.51		2.51 (0.05)	2.44 (0.06)	0.84 (0.05)	0.64 (0.04)
	S3	.59		2.69 (0.04)	2.42 (0.06)	0.64 (0.05)	0.50 (0.04)
	S4	.71		2.93 (0.04)	2.60 (0.09)	0.54 (0.04)	0.49 (0.05)
	S5	.56		3.40 (0.04)	3.41 (0.05)	0.44 (0.04)	0.36 (0.03)
	S6	.66		3.24 (0.04)	3.29 (0.06)	0.40 (0.04)	0.45 (0.04)
	S7	.49		2.82 (0.04)	2.64 (0.07)	0.79 (0.09)	0.78 (0.05)
	S8	.45		2.87 (0.04)	2.64 (0.06)	0.51 (0.04)	0.66 (0.05)
Peer substance use	Cigarette	.71		0.91 (0.07)	0.91 (0.07)	1.03 (0.10)	1.26 (0.11)
	Alcohol	.81		1.81 (0.09)	2.05 (0.13)	1.40 (0.16)	1.31 (0.15)
Baseline substance use	Marijuana	.83		1.55 (0.09)	1.67 (0.14)	1.28 (0.16)	1.17 (0.17)
	Hard drug	.60		0.55 (0.06)	0.57 (0.07)	0.89 (0.11)	1.12 (0.12)
Follow-up substance use	Cigarette	.58		0.14 (0.02)	0.14 (0.02)	0.13 (0.04)	0.13 (0.04)
	Alcohol	.60		0.41 (0.04)	0.52 (0.07)	0.39 (0.07)	0.33 (0.08)
	Marijuana	.71		0.27 (0.04)	0.29 (0.07)	0.40 (0.13)	0.22 (0.06)
	Hard drug	.54		0.11 (0.03)	0.16 (0.06)	0.29 (0.10)	0.24 (0.09)
Follow-up substance use	Cigarette	.72		0.29 (0.05)	0.29 (0.05)	0.49 (0.18)	0.18 (0.08)
	Alcohol	.71		0.56 (0.05)	0.56 (0.07)	0.57 (0.18)	0.24 (0.06)
	Marijuana	.75		0.36 (0.06)	0.35 (0.08)	0.49 (0.20)	0.24 (0.08)
	Hard drug	.72		0.19 (0.05)	0.26 (0.07)	0.38 (0.16)	0.16 (0.08)

Note. Indicator intercepts or error variances that differed significantly between genders are in boldface and were not constrained to be equal across gender during multiple group analysis. Standardized coefficients are presented for factor loadings because none of the factor loadings differed across gender. Estimates for intercepts and error variances are unstandardized.

A1 = "Read and speak English most often"; A2 = "Speak usually English with friends"; A3 = "Like to watch and listen to English language movies, TV, and radio shows"; A4 = "Speak usually English at home"; S1 = "I enjoy arguing with people"; S2 = "If I think something someone says is stupid, I tell them so"; S3 = "If I am angry I act like it"; S4 = "My mouth gets me in trouble a lot"; S5 = "I do things just to get attention"; S6 = "Sometimes I provoke people just for the fun of it"; S7 = "I hate being wrong"; S8 = "I say things that I regret later."