



Published in final edited form as:

Asian Am J Psychol. 2010 December ; 1(4): 261–274. doi:10.1037/a0021703.

Substance use among Asian American adolescents: Influence of race, ethnicity, and acculturation in the context of key risk and protective factors

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Abstract

This study examines the relative influence of race/ethnicity, acculturation, peer substance use, and academic achievement on adolescent substance use among different Asian American ethnic groups and U.S. racial/ethnic groups. Data from the Wave 1 in-home sample of the National Longitudinal Study of Adolescent Health was used to examine lifetime use of alcohol, tobacco, and marijuana in a full adolescent sample of all racial/ethnic groups (N=20,745) and a subsample of Asian American adolescents (N=1,248). Path analysis examined the hypothesized relationships of peer substance use and acculturation as risk factors and academic achievement as a protective factor for racial/ethnic groups. The results indicated that when Asian American adolescents were compared to other major U.S. racial/ethnic groups, peer use and acculturation were both significant mediators of smoking, drinking, and marijuana use, and academic achievement mediated each type of use at a trend level. For Asian American ethnic groups, peer use is a risk factor and, to a lesser extent, academic achievement a protective factor for substance use. Also, although acculturation is a predictor of substance use, when peer use and academic achievement are taken into account, acculturation -- like ethnicity -- no longer predicts use. Mediation analyses indicated that: peer substance use mediates smoking, drinking, and marijuana use; academic achievement does not; and acculturation mediates substance use for some substances and some Asian American ethnic groups. The results are discussed for their implications for understanding how culturally-specific approaches can inform preventive interventions.

Keywords

Asian Americans; substance use; adolescents; acculturation; peers; prevention

Recent research has shown that substance use among Asian American adolescents is a growing concern (Hahm, Wong, Huang, Ozonoff, & Lee, 2008; Lee, Battle, Lipton, & Soller, 2009). For example, several studies have found that binge drinking is a serious problem for Asian American adolescents (Hahm, Lahiff, & Guterman, 2004; Hahm et al., 2008) and that prevalence rates vary significantly among Asian American ethnic groups,

with some groups reporting high levels of use (Choi, 2008; Le, Goebert, & Wallen, 2009). In addition, even though substance use rates are generally lower for Asian American adolescents than for other U.S. racial/ethnic groups (Choi, Harachi, Gillmore, & Catalano, 2006; Kameoka, Thai, & Wong, 2004; SAMHSA, 2009), these prevalence rates may be higher than those reported for other racial/ethnic groups under certain conditions (Johnson, 2004; Wu, Pilowsky & Schlenger, 2005).

Currently, research on Asian American adolescent substance use has a number of limitations. First, the generally lower prevalence of substance use among Asian American adolescents has resulted in their not being sampled in some national epidemiological studies (Harachi, Catalano, Kim, & Choi, 2001; Kuramoto & Nakashima, 2000). Lower prevalence rates are consistent with the stereotype of Asian Americans as a “model minority” that is successful and self-reliant, and one that has few problems (Okazaki & Nagayama Hall, 2002; Sue, 1990). Another limitation of current research is that Asian Americans are generally combined into one racial/ethnic category with Pacific Islanders, obscuring substance use differences among ethnic groups (Harachi et al., 2001; Kameoka et al., 2004). In addition, to date, there has been very little research that has examined substance use along with related risk and protective factors among Asian American adolescent ethnic groups (Harachi et al., 2001), despite the considerable variability among these groups (Choi, 2008; Le et al., 2009).

Thus, there is a need to examine substance use prevalence among Asian American adolescents in the context of key risk and protective factors that have been shown to be empirically related to substance use; specifically, racial/ethnic group, acculturation, peer substance use, and academic achievement. We examine these factors in the present study through use of the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative dataset of adolescents’ health and health behaviors, that allows for comparisons of substance use prevalence rates for Asian American adolescents relative to other major U.S. racial/ethnic groups and among major Asian American ethnic groups.

A Conceptual Framework for Understanding Asian American Adolescent Substance Use

Culture shapes individual values, attitudes, behaviors, and the norms governing each of these (Oetting, Donnermeyer, Trimble, & Beauvais, 1998). Acculturation is the adoption, among immigrants or a minority cultural group, of values, attitudes, and behaviors of the host society (Berry, Trimble, & Olmedo, 1986). An acculturative stress framework posits that different stressors (e.g., new social norms, language barriers, discrimination) may place adolescents at greater risk for substance use (Kuramoto & Nakashima, 2000; Suinn, 2010; Unger et al., 2004). Thus, as adolescents become acculturated faster than their parents, the discrepancy between acculturation levels can undermine parental authority and youth may rebel or engage in problem behaviors (Portes & Rumbaut, 2001; Unger et al., 2004). Another conceptual framework for understanding adolescent substance use within a cultural context is the cultural values paradigm (Unger et al., 2004). This perspective maintains that cultural values shape attitudes and behaviors towards substance use, either promoting or protecting against use. Values that encourage individualism and that promote the social

norms associated with substance use are risk factors; those that encourage respect for family and social harmony within the community are protective factors (Unger et al., 2004).

Research has generally shown that as the children of Asian immigrants become more acculturated, rates of problem behaviors, such as substance use, increase (Bankston & Zhou, 1997; Hahm et al., 2003, 2004; Hussey et al., 2007). One widely-established factor shown to increase adolescent risk for substance use is association with substance-using peers (Curran, Stice, & Chassin, 1997; Hahm et al., 2004; Oetting & Beauvais, 1987; Scheier, 2001). In addition, studies have shown that as immigrant youth become more acculturated, they are more likely to associate with American peers who may influence their use of substances (Bankston & Zhou, 1997). Yee (1999) has further argued that Asian American adolescents may use substances to gain acceptance from their American peers.

Another factor consistently associated with increased substance use among adolescents is lower academic achievement (Choi, 2007; Hawkins, Catalano, & Miller, 1992). Among Asian American adolescents, Ellickson and Morton (1999) have demonstrated that lower academic achievement predicts increased drug use. In addition, Choi (2007) has found that academic performance is a stronger predictor of particular behaviors (e.g., getting drunk, having five or more drinks) for Asian and Pacific Islander adolescents than for those of other racial/ethnic backgrounds.

To date, however, studies have not examined the *relative* contribution of these two risk and protective factors, peer substance use and academic achievement, for Asian American adolescents in comparison to other U.S. racial/ethnic groups and among Asian American ethnic groups. Such research is essential for understanding the importance of previously established factors in relation to one another for their association to substance use, and for developing empirically-grounded preventive interventions that draw on culturally-specific risk and protective factors.

Study Purpose and Hypotheses

Given the importance of acculturation, peer substance use, and academic achievement in understanding Asian American adolescent substance use, we conceptualize each of these as hypothesized mediators of adolescent substance use for the various U.S. racial/ethnic groups and for specific ethnic groups within a given racial/ethnic category as shown in Figure 1.

In an initial set of path analyses comparing Asian American adolescents to other U.S. racial/ethnic groups (White, African American, American Indian, Hispanic, bi-/multi-racial, and other), we hypothesize that after controlling for age and gender: (a) racial/ethnic effects are mediated by acculturation, and that acculturation effects are mediated by peer use (as a risk factor) and academic achievement (as a protective factor) on substance use; and (b) after accounting for acculturation, peer use, and academic achievement, one's racial/ethnic group does not significantly predict substance use as these other contextual factors are more salient. Then in a second set of path analyses, we examine these same paths for the largest Asian American ethnic groups (Chinese, Filipinos, Asian Indians, Vietnamese, Korean, Japanese) which account for 90 percent of Asian Americans in the U.S. (Reeves & Bennett, 2004). Given the limited research currently available on Asian American adolescent

substance use by ethnic group, we examine the relationship of acculturation, peer substance use, and academic achievement on substance use as exploratory analyses.

Method

Add Health is a nationally representative dataset of adolescents' health and health behaviors and their relationship to multiple social contexts, such as the school, family, and community. In the present study, we used Wave 1 data which includes both in-school and in-home samples of youth in grades 7–12. A complete description of the Add Health study design can be found elsewhere (Harris et al., 2008). Data was obtained using audio computer-assisted self-interviewing (A-CASI) technology with laptop computers; each participant heard questions through earphones. This method has been found to increase privacy and the accuracy of sensitive questionnaire content (Hallfors, Khatapoush, Kadushin, Watson, & Saxe, 2000; Newman et al., & Paone, 2002; Turner et al., 1998).

Sample

Full Sample—The full in-home sample from Wave 1 included adolescents from all racial/ethnic groups (N=20,745). Respondents by racial/ethnic group were as follows: White (n=9,644), African American (n=3,794), Hispanic (n=3,230), Asian (n=1,248), bi-/multi-racial (n=735), other race (n=171), and American Indian (n=102). The average age of adolescents in the full sample was 16.2 years (SD=1.71) and the majority were in grades 9–12 (71.1%). Seventy-two percent were U.S. born, nine percent were born outside the U.S., and the rest had missing information.

Asian American Sample—The Asian American adolescent sample included only individuals of Asian descent (N=1,248). Filipinos (n=528) were the largest group in the sample, followed by Chinese (n=262), Korean (n=85), Vietnamese (n=65), Japanese (n=36), and Asian Indians (n=29). Respondents who reported being bi-/multi-racial or other Asian were excluded in order to focus on comparisons among the top six largest Asian ethnic groups. In the Add Health sample, there were no separate distinctions for respondents with a Pacific Islander background. The average age of this sample was 16.7 (SD=1.61) and the majority were in grades 9–12 (83.3%). Forty-nine percent were U.S. born, 39 percent were born outside the U.S., and the remainder had missing information.

Measures

We used several measures to assess adolescents' racial/ethnic background, acculturation, peer substance use, academic achievement, and substance use (Resnick, Bearman, & Blum, 1997).

Race/Ethnicity—Responses to two items determined adolescents' status in a major U.S. racial/ethnic group -- whether they were of Hispanic/Latino descent and whether they were White, African American, Asian/Pacific Islander, American Indian/Native American, or other. Adolescents' could indicate more than one category for their race/ethnicity. These responses yielded the following racial/ethnic groups: Hispanic, White, African American, American Indian, Asian/Pacific Islander, other, and bi-/multi-racial. Next, responses

regarding Asian ethnicity were used to designate adolescents as Chinese, Filipino, Asian Indian, Japanese, Korean, and Vietnamese. Once again, adolescents were able to indicate more than one category for ethnicity as well as “other”, although only the six major ethnic groups were included in the analyses.

Acculturation—We assessed acculturation using responses to three items: (a) English use at home (yes=1; n= 0); (b) place of birth (U.S. born=1; foreign born=0); and (c) length of residency in the U.S. (10+ years of residence=1; less than 10 years of residence=0). This method of employing the median split for length of residency for acculturation has been used with success in other studies (Hahm et al., 2004; Vega, Alderete, Kolody & Aguilar-Gaxiola, 1998). Responses were then aggregated into an acculturation index with scores ranging from 1 (least acculturated) to 5 (most acculturated). More weight was given to speaking English at home because language use has been shown to be an accurate indicator of acculturation (Epstein, Botvin, Dusenbury, & Diaz, 1996; Phinney, 1990; Unger et al., 2000). At level 1, the respondent did not speak English at home, was born outside the U.S., and lived less than 10 years in the U.S. At level 2, the respondent only (a) lived in the U.S. for more than 10 years or (b) was born in the U.S. At level 3, the respondent did not speak English at home but was born and lived in the U.S. for more than 10 years. At level 4, the respondent (a) spoke English at home, (b) spoke English at home and lived in the U.S. for more than 10 years, or (c) spoke English at home and was born in the U.S. Finally, at level 5, the respondent spoke English at home, was born in the U.S., and lived more than 10 years in the U.S.

Peer Substance Use—On a scale of 0 (no friends) to 3 (three friends), participants were asked how many of their three best friends smoke at least one cigarette per day, drink alcohol at least once per month, and use marijuana at least once per month. These items were then summed to form a composite score for peer substance use.

Academic Achievement—Adolescents reported their grades in four subjects for the year prior to the interview: (a) English or language arts; (b) math; (c) history or social science; and (d) science. Grades ranged from 1 for a “D” or lower to 4 for an “A”, and an overall grade point average (GPA) was calculated by taking the mean across the four grades.

Substance Use—A lifetime prevalence estimate of adolescents’ substance use consisted of three ‘ever use’ binary variables for alcohol, smoking, and marijuana. We chose these items to provide a more accurate estimator of substance use than would have been the case by using the frequency of use over a given period of time, such as 30 days or 12 months.

Data Analyses

For both the full sample and the Asian American sample, we used a series of three path models to examine the relative influence of study variables on lifetime prevalence of alcohol, tobacco, and marijuana use. Part A of Figure 2 shows racial/ethnic groups directly predicting lifetime prevalence of drinking, smoking, and marijuana use. Part B of the figure shows the potential direct influence of acculturation and the direct or indirect influence of race/ethnicity on these three types of substance use. Finally, Part C adds the potential

mediating influences of peer use and academic achievement into the model. The path models were run using *Mplus 5.1* (Muthen & Muthen, 2007), with respondents' age and gender as control variables. *Mplus 5.1* is able to appropriately estimate path coefficients for dichotomous endogenous variables such as the three substance use variables in the present study. Weighted data was used in all analyses to ensure generalizability to the larger adolescent population in the United States.

Full Sample—In Model 1, race/ethnicity was dummy coded (with Asian Americans as the reference group) and examined for its relationship to alcohol, tobacco, and marijuana use. Model 2 entered acculturation as a potential mediator of racial/ethnic group on substance use, and Model 3 included peer use and academic achievement as mediators of acculturation on substance use.

Asian American Sample—In a second set of analyses, these same factors were examined using Asian American ethnic groups (e.g., Chinese, Filipino, Asian Indian, etc.), with Filipinos as the reference group (the largest Asian American ethnic group in the Add Health dataset). Again, three models were examined, beginning with a model assessing the influence of ethnic group on substance use, and then adding an acculturation effect in Model 2, and peer use and academic achievement effects on substance use in Model 3.

Results

Acculturation, Peer Substance Use, and Academic Achievement among U.S. Racial/Ethnic Groups

Table 1 shows model fit indices, odds ratios, and significance values for all three sets of path analyses described earlier. For RMSEA, values of less than 0.05 represent good fit, values between 0.05 and 0.08 are considered a fair fit, and values greater than 0.10 indicate a poor fit (Browne & Cudeck, 1993). Due to the large sample size, Chi-square values were significant for all models, but CFI and RMSEA values for all models showed good model fit (Quintana & Maxwell, 1999).

Model 1 examined the relationship between racial/ethnic group and lifetime prevalence of drinking, smoking, and marijuana use. The results indicated that, with Asians as the reference group, race/ethnicity was a significant predictor for drinking, smoking, and marijuana use for all groups except African Americans (Table 1A), although African American adolescents did report significantly higher marijuana use. White, Hispanic, American Indian, other race, and bi-/multiracial adolescents had higher odds of using all substances than Asian Americans. For all three ever use variables, the group with the highest odds of using substances relative to Asian Americans was American Indians (2.2 to 3.6 times higher).

The second path model examined the mediating effect of acculturation on the racial/ethnic differences identified in Model 2 (Table 1B). As expected, all the other racial/ethnic groups were more acculturated than Asian Americans. In addition, acculturation was a significant predictor for each substance, with higher odds of use for those more acculturated to the U.S. In addition, after taking acculturation into account, all racial/ethnic categories were

predictive of substance use, with most groups having higher odds of ever drinking, smoking, and using marijuana and African Americans having significantly lower odds of using alcohol.

Model 3 examined these variables after entering peer substance use and academic achievement (Table 1C). Importantly, racial/ethnic group status no longer predicted substance use prevalence for Whites, Hispanics, American Indians, other race, and bi-/multi-racial groups, but did continue to predict substance use among African Americans, in that African Americans have a significantly lower likelihood of drinking, smoking, or marijuana use than Asian Americans. However, all three risk/protective factors, acculturation, peer substance use, and academic achievement were significantly related to all three types of substance use prevalence. Acculturation was associated with a 5 to 13 percent increased likelihood of substance use, peer substance use with a 21 to 25 percent increased likelihood of use, and academic achievement with a 25 to 33 percent decreased likelihood of use (i.e., *OR* ranges from .75 to .67).

Indirect mediating effects of acculturation on drinking, smoking, and marijuana use were assessed using the Sobel test, and showed significant mediating effects through peer substance use for ever using alcohol ($z = 0.065, p < 0.001$), ever smoking ($z = 0.063, p < 0.001$), and ever using marijuana ($z = 0.073, p < 0.001$). Trend-level indirect effects were observed through academic achievement for ever using alcohol ($z = 0.012, p = 0.052$), ever smoking ($z = 0.016, p = 0.052$), and ever using marijuana ($z = 0.016, p = 0.053$). Sobel tests also showed a significant indirect effect for acculturation on alcohol, tobacco, and marijuana use; only African American adolescents were significantly less likely to ever use any substances when compared to Asian American adolescents.

Acculturation, Peer Substance Use, and Academic Achievement among Asian American Ethnic Groups

We also conducted analyses with the same set of path models using Asian American ethnic groups to assess the influence of acculturation, academic achievement, and peer substance use on drinking, smoking, and marijuana use. These analyses were intended to complement racial/ethnic group analyses by assessing the relative influence of the same risk and protective factors within a specific cultural context: Asian American adolescent ethnic groups in relation to one another.

Model 1 examined the relationship between Asian American ethnic groups and lifetime prevalence of drinking, smoking, and marijuana use. With Filipino adolescents as the reference group, the results show that the model significantly predicted prevalence of use only for the Chinese and Vietnamese adolescents (Table 2A). When compared to Filipinos, Vietnamese adolescents were less likely to ever smoke, drink, or use marijuana, and Chinese adolescents had lower odds of ever smoking or using marijuana.

The second path model examined the mediating effect of acculturation on the relationship between ethnic group and substance use (Table 2B). Chinese, Korean, and Vietnamese adolescents were less acculturated than Filipinos, and more acculturated adolescents had a 17 percent higher likelihood of drinking or smoking and a 21 percent higher likelihood of

ever using marijuana. After accounting for acculturation, Vietnamese adolescents still had a 46 percent lower likelihood of smoking ($OR=.54$) and a 76 percent lower likelihood of ever using marijuana ($OR=.24$); Chinese adolescents were 49 percent less likely to ever use marijuana ($OR=.51$).

Finally, Model 3 examined ethnicity, acculturation, academic achievement, and peer substance use relative to one another for their relationship to drinking, smoking, and marijuana use (Table 2C). As shown in the table, once academic achievement and peer substance use was accounted for in the model, acculturation was no longer a significant predictor of drinking, smoking, or marijuana use, despite its prominence as a predictor when these two factors were not included in the model. Academic achievement was associated with reduced substance use by 33 to 47 percent (i.e., the OR ranges from .67 to .53), and peer substance use was associated with increased substance use by 29 to 32 percent when all three risk factors and ethnicity were examined together. Importantly, with the exception of a significantly lower likelihood of marijuana use among Vietnamese adolescents, ethnic group status was not related to drinking, smoking, or marijuana use when taking acculturation, academic achievement, and peer use into account.

Once again, we conducted Sobel tests to examine the significance of hypothesized mediation effects for peer substance use, academic achievement, and acculturation on substance use prevalence. Analyses revealed significant indirect effects through peer use for ever using alcohol ($z = 0.060, p = 0.027$), ever smoking ($z = 0.063, p = 0.016$), and ever using marijuana ($z = 0.066, p = 0.022$). However, the indirect effect of Asian American ethnicity through academic achievement was not significant. Finally, indirect effects for acculturation on alcohol, tobacco, and marijuana use varied for Asian American adolescents. For tobacco use, there was an indirect effect for Korean and Vietnamese adolescents, and for alcohol and marijuana use, there was an indirect effect for Chinese, Korean, and Vietnamese adolescents.

Discussion

The present study examined the relative influence of race/ethnicity, acculturation, peer substance use, and academic achievement on substance use among Asian American adolescents. The results showed that, with one exception, when examining Asian American adolescents relative to adolescents from other U.S. racial/ethnic groups, membership in a racial/ethnic group was not a significant predictor of lifetime prevalence of drinking, smoking, and marijuana use once acculturation, peer substance use, and academic achievement were taken into account. The one important exception to this finding was that African American adolescents consistently had lower use than Asian Americans across all substances. In addition, Asian American adolescents were the least acculturated of all U.S. racial/ethnic groups, had generally higher academic achievement, and fewer peers who used substances. Sobel tests of indirect effects indicated that peer substance use was a significant partial mediator of racial/ethnic and acculturation effects on substance use. Finally, among U.S. racial/ethnic groups, academic achievement partially mediated racial/ethnic group status and acculturation effects at a trend level of significance.

Analyses also examined the influence of ethnic group, acculturation, peer use, and academic achievement on substance use for the six major Asian American ethnic groups. The results showed that, when examining Asian American ethnic groups, after accounting for acculturation, peer substance use, and academic achievement, there was only one difference in substance use prevalence attributable to ethnic group status (i.e., Vietnamese adolescents had lower marijuana use). In addition, Sobel tests of indirect effects indicated that peer substance use functions as an important partial mediator of acculturation effects on substance use among Asian American adolescents; whereas, academic achievement does not. These results suggest that differences in drinking, smoking, and marijuana use among Asian American ethnic groups are primarily attributable to individual variation in peer substance use and academic achievement, and that peer substance use is a key risk factor for adolescent substance use.

These results support previous research indicating that association with substance using peers is a powerful proximal risk factor for substance use involvement (Kim, Zane, & Hong, 2002; Oetting & Beauvais, 1987; Oetting et al., 1998), and one that mediates acculturation effects on substance use among Asian American adolescents. Given that peer influences may take place in specific cultural contexts, further research to examine these contexts is vital (Harachi et al., 2001).

Although acculturation was found to be a less powerful predictor of drinking, smoking, and marijuana use than peer substance use and academic achievement, the results do suggest that acculturation is likely a more relevant factor in relation to substance use among Asian American adolescents than it is for other U.S. racial/ethnic groups. Moreover, among Asian Americans, acculturation is about equally predictive of substance use for Chinese, Korean, and Vietnamese adolescents relative to Filipinos. Although a detailed exploration of the reasons for this finding is beyond the scope of this paper, notable historical and cultural factors may provide some clues. As a group, Filipino immigrants tend to be more Westernized than other Asian immigrants because of the Philippine's history as an American colony in the early 1900s (Agbayani-Siewert & Revilla, 1995). Many Filipinos are familiar with American lifestyles and speak English (Jobu, 1988), thus resulting in a greater level of acculturation for Filipino immigrants. In contrast, even though large numbers of Chinese have lived in the U.S. since the mid-1800s, their early history is marked by discriminatory statutory policies and varying levels of acceptance, thus making them less likely to have fully integrated into American society (Wong, 1995). Similarly, research has suggested that Koreans are generally less acculturated to the U.S., as reflected in their generally higher level of ethnic identity, practicing of Korean customs, speaking Korean, and being involved in Korean organizations (Min, 1995). And lastly, given that Vietnamese Americans represent among the most recent immigrant groups in the U.S., their lower level of acculturation is not surprising (Thai, 2003).

This study contributes to the growing literature that examines health behaviors and outcomes as well as related risk and protective factors in the context of culturally-specific ethnic and racial differences (Cohen, 2009; Harachi et al., 2001; Szapocznik, Prado, Burlew, Williams, & Santisteban, 2007). Research on specific racial/ethnic groups is essential to establishing an empirical basis for culturally-specific theories, interventions, services, and

policies (Cohen, 2009; Sue, 1999; Tebes, 2000, 2010). Although, in the present study, acculturation, race, and ethnicity did not directly influence adolescent substance use when peer use or academic achievement were taken into account, these findings do not mean that cultural influences should be ignored in preventive interventions. To the contrary, culturally-specific factors, such as culturally-relevant practices and beliefs, may be critical to developing theoretically-grounded, empirically-based, and culturally-specific intervention approaches that address peer influences on substance use in a developmentally appropriate manner (Harachi et al., 2001). For example, interventions that teach peer resistance strategies to prevent substance use may need to incorporate skills training that takes into account the challenges faced by more acculturated Asian American adolescents whose parents insist on traditional practices within the home, such as saving face (Zane & Yeh, 2002) and filial piety (Ho, 1994). Previous research has shown the potential value and some of the challenges of developing culturally-specific preventive interventions (Kumpfer, Alvarado, Smith, & Bellamy, 2002).

Study Limitations

The present study has several limitations. One limitation is that the Add Health data examined in this study was based on self-report; nevertheless, previous research has shown self-report responses on the Add Health database to be generally reliable and valid (Sieving et al., 2001). A related limitation is that peer substance use was measured using only the self-report of each study participant. Although an alternative strategy in which the behavior of multiple friends is assessed (Le et al., 2009) offers added benefit in explaining the variation for behavior (Kiesner, Kerr, & Stattin, 2004), the approach used in this study has been widely accepted (e.g., Choi, 2007, 2008).

Another study limitation is that only cross-sectional relationships were examined. Although longitudinal analyses are important, examination of cross-sectional analyses within a carefully specified hypothesized model is often of equal importance, especially when no such analyses have been done. In the present study, we examined the relative influence of three key risk and protective factors for substance use among Asian American adolescents – acculturation, peer substance use, and academic achievement – that had previously not been examined in relation to one another for U.S. racial/ethnic groups and Asian American ethnic groups. Doing so yielded important new findings about the relative importance of each factor for major U.S. racial/ethnic groups and for Asian American ethnic groups. Future research should examine these relationships longitudinally.

In another limitation, this study assessed acculturation using the only variables available through the Add Health dataset -- English use at home, place of birth, and length of residence in the U.S. Clearly, these variables do not reflect the complexity of acculturation (Padilla, 1982; Rudmin, 2009; Schwartz et al., 2010). However, these and similar variables have yielded useful information about acculturation in previous research (Hahm et al., 2003; 2004; Harachi et al., 2001; Hussey et al., 2007), and offer opportunities to enhance knowledge about acculturation among Asian American adolescents because of their availability in a nationally representative dataset such as Add Health. Future waves of the Add Health study should consider using measures that offer a textured understanding of

acculturation for Asian Americans (see Gupta & Yick, 2001; Kim, Atkinson, & Yang, 1999; Ryder, Alden, & Paulhus, 2000; Suinn, Rickard-Figueroa, Lew, & Vigil, 1987).

Conclusions

This study showed that acculturation among Asian American adolescents is a critical factor in substance use prevalence relative to its importance for other U.S. racial/ethnic groups, and that peer substance use partially mediates the relationship of acculturation to drinking, smoking, and marijuana use while academic achievement does not. Also, acculturation was no longer found to be a significant predictor of substance use among Asian American ethnic groups when peer substance use and academic achievement are taken into account. These results have important implications for developing culturally-specific preventive interventions for Asian American adolescents.

Acknowledgments

This research was supported, in part, by a training grant by the National Institute for Drug Abuse (T32 DA019426). We would like to thank members of the Risk & Resilience Research Group for their helpful comments on an earlier draft of this manuscript. This research uses data from Add Health, a program project designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris, and funded by a grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 17 other agencies. Special acknowledgment is due to Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Persons interested in obtaining data files from Add Health should contact Add Health, Carolina Population Center, 123 W. Franklin Street, Chapel Hill, NC 27516-2524 (addhealth@unc.edu). No direct support was received from grant P01-HD31921 for this analysis.

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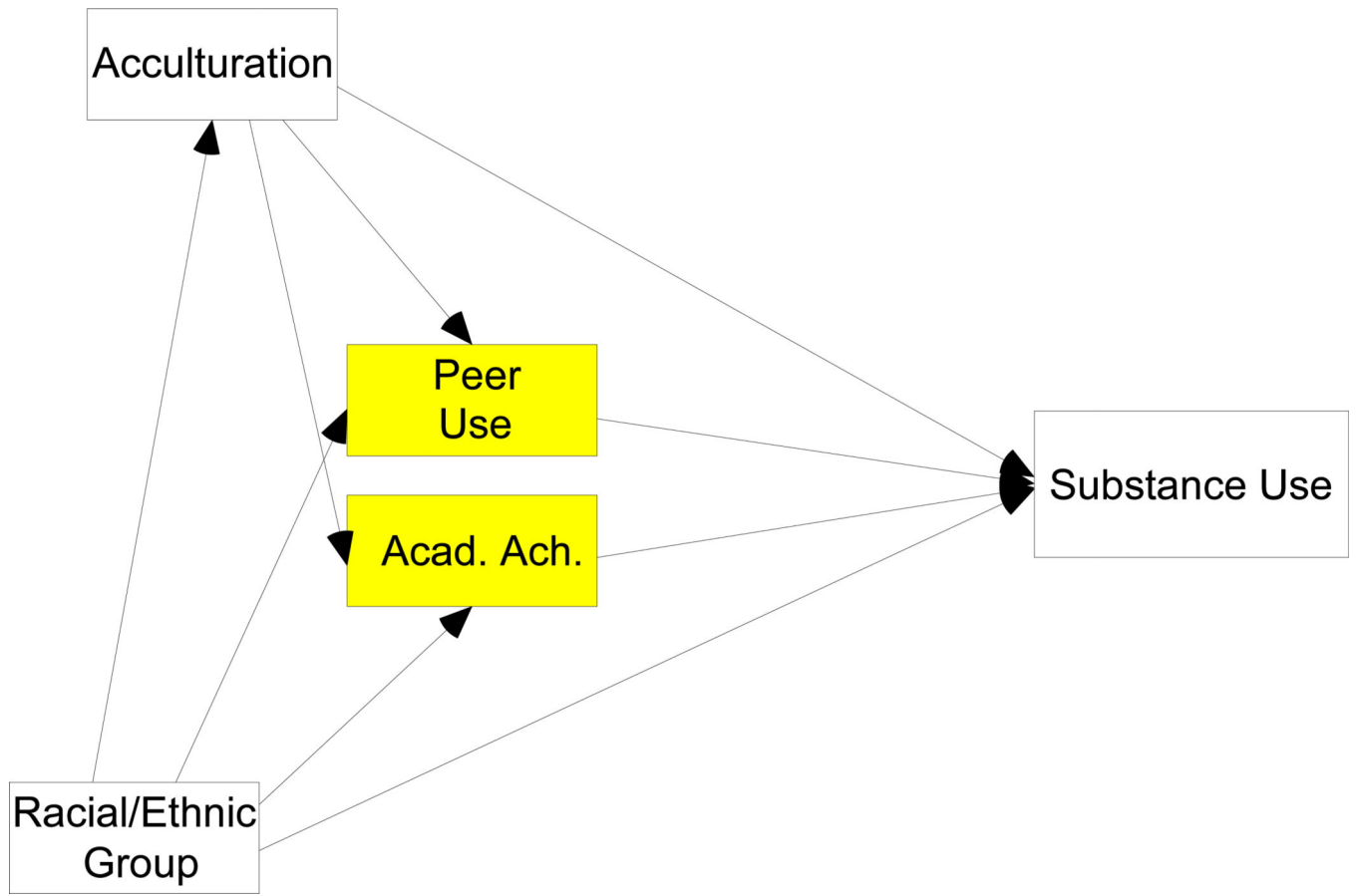


Figure 1. Conceptual Model of Adolescent Substance Use in the Context of Racial/Ethnic Groups, Acculturation, Peer Substance Use, and Academic Achievement

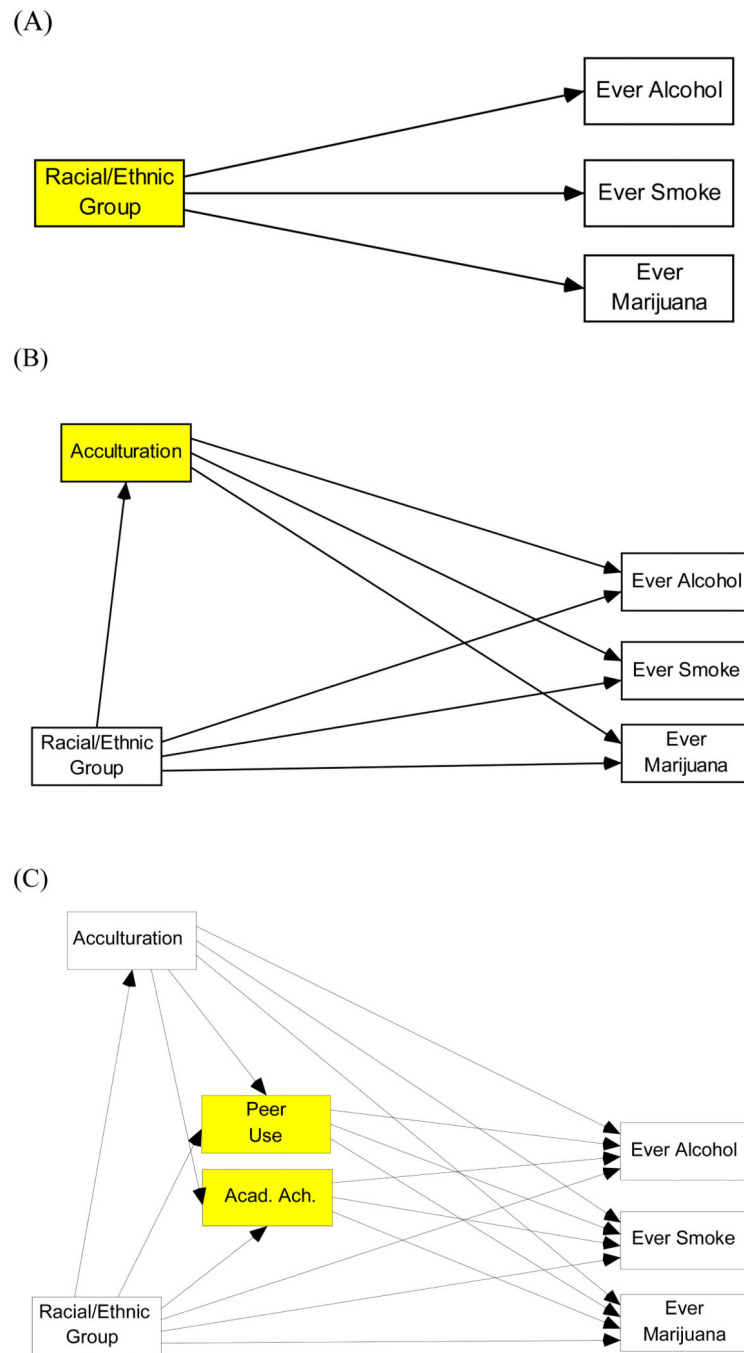


Figure 2.
Path Analysis Model of Adolescent Substance Use

Table 1

Influence of Racial/Ethnic Group, Acculturation, Peer Substance Use, and Academic Achievement on Adolescent Substance Use

		Ever Alcohol	Ever Smoke	Ever Marijuana
		<i>OR</i>	<i>OR</i>	<i>OR</i>
(A) Racial/Ethnic Group and Substance Use	White	1.61**	1.71**	1.58**
	Hispanic	1.45**	1.34**	1.57**
	African American	1.09	1.14	1.42*
	American Indian	2.24**	2.94**	3.58**
	Other Race	1.69**	1.51**	1.82**
	Bi-/Multi-Racial	1.75**	1.76**	2.07**
		Acculturation		
		β		
(B) Racial/Ethnic Group, Acculturation, and Substance Use	White	1.00**		
	Hispanic	0.19**		
	African American	0.75**		
	American Indian	0.14**		
	Other Race	0.12**		
	Bi-/Multi-Racial	0.37**		
X ² (2, n=18,906) = 19.72, <i>p</i> <.01 CFI=.99 RMSEA=.02				
		Ever Alcohol	Ever Smoke	Ever Marijuana
		<i>OR</i>	<i>OR</i>	<i>OR</i>
Acculturation		1.19**	1.17**	1.29**
White		1.21*	1.32**	1.04
Hispanic		1.34**	1.23*	1.41**
African American		0.81*	0.88	0.92
American Indian		1.68**	2.27**	2.38**
Other Race		1.43*	1.31	1.41*
Bi-/Multi-Racial		1.31*	1.36**	1.36*
		Acculturation		
		β		
(C) Racial/Ethnic Group, Acculturation, Peer Use, Academic Achievement, and Substance Use	White	1.01**		
	Hispanic	0.19**		
	African American	0.75**		
	American Indian	0.14**		
	Other Race	0.12**		

$X^2(7, n=18,915) = 210.43, p < .01$ CFI=.94 RMSEA=.04

	Peer Use			GPA		
	Ever Alcohol		Ever Smoke	Ever Marijuana		
	<i>OR</i>	<i>OR</i>	<i>OR</i>	<i>OR</i>	<i>OR</i>	<i>OR</i>
Bi-/Multi-Racial	0.37**					
Acculturation	1.05*	1.05*	1.13**	0.10**	-0.04	
Academic. Ach.	0.75**	0.67**	0.67**	0.07	-0.12*	
Peer Use	1.22**	1.21**	1.25**	0.07*	-0.21**	
White	1.06	1.13	0.90	-0.01	-0.25**	
Hispanic	1.01	0.90	1.00	0.03**	-0.06**	
African American	0.77**	0.76**	0.82*	0.02	-0.03*	
American Indian	0.98	1.29	1.23	0.05**	-0.10**	
Other Race	1.14	1.06	1.09			
Bi-/Multi-Racial	1.00	0.99	0.96			

Note. OR=odds ratio; β =standardized beta coefficient; CFI=comparative fit index; RMSEA=root mean square error of approximation; GPA=grade point average. The reference group is Asian/Pacific Islander youth.

* $p < .05$;

** $p < .01$.

Table 2

Influence of Asian American Ethnic Group, Acculturation, Peer Substance Use, and Academic Achievement on Adolescent Substance Use

		Ever Alcohol	Ever Smoke	Ever Marijuana
		<i>OR</i>	<i>OR</i>	<i>OR</i>
(A) Asian American Ethnic Group and Substance Use	Chinese	0.97	0.61*	0.45**
	Japanese	0.91	0.71	0.71
	Asian Indian	0.65	1.11	0.74
	Korean	0.73	0.87	0.53
	Vietnamese	0.63*	0.43**	0.17**
	<hr/>			
		Acculturation		
		β		
(B) Asian American Ethnic Group, Acculturation, and Substance Use	Chinese	-0.15**		
	Japanese	0.10		
	Asian Indian	-0.00		
	Korean	-0.28**		
	Vietnamese	-0.37**		
<hr/>				
X ² (2, n=1,005) = 11.24, <i>p</i> <.01 CFI=.94 RMSEA=.02		Ever Alcohol	Ever Smoke	Ever Marijuana
		<i>OR</i>	<i>OR</i>	<i>OR</i>
	Acculturation	1.17**	1.17**	1.21**
	Chinese	0.85	0.68	0.51*
	Japanese	0.79	0.60	0.58
	Asian Indian	0.64	1.10	0.76
	Korean	0.85	1.06	0.79
	Vietnamese	0.84	0.54*	0.24**
<hr/>				
		Acculturation		
		β		
(C) Asian American Ethnic Group, Acculturation, Peer Use, Academic Achievement, and Substance Use	Chinese	-0.14*		
	Japanese	0.09		
	Asian Indian	-0.01		
	Korean	-0.26**		
	Vietnamese	-0.38**		
<hr/>				
		Peer Use	GPA	
		β	<i>B</i>	
	Acculturation	0.17*	-0.10	

$X^2(6, n=1,005) = 19.75, p < .01$ CFI=.91 RMSEA=.01

Chinese	-0.17*	0.29**	
Japanese	-0.05	0.11*	
Asian Indian	0.05	0.14	
Korean	-0.11	0.19	
Vietnamese	-0.10	0.09	
	Ever Alcohol	Ever Smoke	Ever Marijuana
	<i>OR</i>	<i>OR</i>	<i>OR</i>
Acculturation	1.05	1.04	1.08
Academic Ach.	0.67**	0.68**	0.53**
Peer Use	1.29**	1.31**	1.32**
Chinese	1.22	1.01	0.87
Japanese	1.02	0.80	0.81
Asian Indian	0.72	1.17	0.90
Korean	1.06	1.25	1.02
Vietnamese	1.02	0.71	0.34**

Note. OR=odds ratio; β =standardized beta coefficient; CFI=comparative fit index; RMSEA=root mean square error of approximation; GPA=grade point average. The reference group is Filipino youth.

* $p < .05$;

** $p < .01$.