Published in final edited form as:

J Stud Alcohol Drugs. 2008 January ; 69(1): 121–128.

Differential Effects of Acculturation on Drinking Behavior in Chinese- and Korean-American College Students*

Christian S. Hendershot, M.S.[†], Tiara M. Dillworth, M.S., Clayton Neighbors, PH.D.[†], and William H. George, PH.D.

Department of Psychology, University of Washington, Box 351525, Seattle, Washington 98195

Abstract

Objective—Recent evidence suggests increasing rates of alcohol use and related disorders among Asian-American young adults. Relatively little research has focused on this group, and few studies have examined heterogeneity in drinking prevalence and correlates across Asian subgroups. This study examined interactive effects of ethnicity, acculturation, and gender on drinking behavior among Asian-American undergraduates.

Method—Participants were 112 Chinese Americans and 108 Korean Americans (mean age = 19.2 years, 61% female) who completed measures of alcohol use, acculturation, and demographic factors. Multivariate analyses examined drinking behavior (defined as quantity, frequency, and duration) as a function of ethnicity, gender, and acculturation.

Results—Overall, Korean ethnicity predicted increased drinking, and acculturation predicted decreased drinking. However, acculturation interacted with ethnicity such that its influence was protective for Korean Americans and negligible for Chinese Americans.

Conclusions—Previous research implicates acculturation as a risk factor for drinking among Asian Americans, but the current findings suggest that protective effects may also exist. Results also indicate that Korean ethnicity is a risk factor particularly in the context of low acculturation. These findings illustrate the need to consider ethnic subgroup differences in drinking rates and in risk and protective factors for alcohol use among Asian Americans.

Although National Surveys usually show low relative rates of alcohol use among Asian Americans, recent epidemiological findings suggest that drinking rates are increasing in this group, particularly among young adults. Between 1991–1992 and 2001–2002, the prevalence of 12-month alcohol dependence, as defined by Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994), more than doubled (from 4.1% to 10.2%) among Asian-American men ages 18–29, whereas rates of 12-month alcohol abuse increased more than fivefold (from .07% to 3.9%) among Asian-American women ages 18–29 (Grant et al., 2004). A prospective study of U.S. college students also showed that rates of heavy episodic (“binge”) drinking increased significantly among Asian students during a 4-year period while declining significantly among white students (Wechsler et al., 1998). These trends, in confluence with the rapid population growth of Asian Americans as a whole (Hahn et al., 2004; Price et al., 2002; So and Wong, 2006), suggest that the incidence of alcohol-use disorders (AUDs) in this group stands to increase over time. Although greater attention to drinking behavior among Asian-American young adults appears warranted, relatively few studies have focused on this population (So and Wong, 2006).

*This research was supported by National Institute on Alcohol Abuse and Alcoholism grant AA016440.

[†]Correspondence may be sent to Christian S. Hendershot at the above address or via chender@u.washington.edu. Clayton Neighbors is with the Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA.

A primary challenge to characterizing drinking behavior among Asian Americans is the significant heterogeneity in substance use that exists across Asian subgroups (Harachi et al., 2001; Price et al., 2002; So and Wong, 2006; Wong et al., 2004; Zane and Kim, 1994). This variability is often masked by the aggregation of Asian subpopulations in epidemiological studies, a practice that continues to be challenged by empirical findings. Data from recent state and national epidemiological surveys suggest considerable variation in substance-use behavior across Asian-American subgroups, with some groups reporting rates of use commensurate with those of whites (Price et al., 2002; Wong et al., 2004). These findings highlight the need to consider ethnic group differences in drinking rates and caution against aggregating Asian subgroups based on presumed homogeneity (Harachi et al., 2001; Price et al., 2002; Wong et al., 2004).

Despite a general lack of research on Asian subgroup differences in alcohol use, it is established that Chinese and Korean cultures differ significantly in terms of drinking patterns. Heavy alcohol use is often condoned in Korean culture, particularly among men (Helzer et al., 1990; Weatherspoon et al., 2001), whereas drinking among Chinese is characterized by moderation (Lu et al., 1997; Zane and Huh-Kim, 1998). In one cross-national study, the lifetime prevalence of a DSM-III (American Psychiatric Association, 1980) AUD was 23% in Korea versus 7% in China (Helzer et al., 1990). This disparity is reflected in the United States, where studies find higher rates of alcohol use and heavy drinking among Korean Americans than Chinese Americans (e.g., Chi et al., 1989; Park et al., 1984). Using data from the National Household Survey on Drug Abuse, Price and colleagues (2002) reported that, across five Asian subgroups, rates of frequent heavy drinking were highest for Korean Americans and lowest for Chinese Americans. College studies also show higher rates of heavy drinking and alcohol dependence among Korean Americans versus Chinese Americans (Luczak et al., 2001, 2003, 2004).

Relatively few studies have evaluated psychosocial correlates of alcohol use among Asian Americans (Harachi et al., 2001), and even fewer have examined differences in risk or protective factors across subpopulations. Studies comparing Asian-American and white adolescents have identified group differences in psychosocial risk or protective factors that may partially account for lower rates of drinking in the former group (e.g., Au and Donaldson, 2000; Keefe and Newcomb, 1996; Newcomb and Bentler, 1986). However, with few exceptions (e.g., Luczak et al., 2003, 2004), efforts to examine differences in psychosocial correlates of drinking across Asian-American subgroups have been rare. Considering the heterogeneity in substance-use patterns across Asian populations, the relative lack of research on subgroup-specific risk and protective factors is a notable limitation (Wong et al., 2004).

Increasing evidence suggests that acculturation has a significant influence on health outcomes among Asian Americans (Salant and Lauderdale, 2003). Although acculturation is a complex concept to define, one way to view the process is by the extent to which individuals learn the customs, attitudes, and behaviors characteristic of a host culture (Zane and Mak, 2003). Some studies allow global inferences about acculturation's effects by comparing the drinking rates of U.S. Asians to their counterparts abroad (e.g., Higuchi et al., 1994; Johnson et al., 1987; Park et al., 1984; Yamamoto et al., 1994); however, these studies typically have not measured acculturation directly. Several studies of Asian Americans show that measured indices of acculturation correlate positively with drinking quantity/frequency (Hahm et al., 2003, 2004; Hendershot et al., 2005; Nakashima and Wong, 2000; Nakawatase et al., 1993; Song et al., 2004; Sue et al., 1979). Most studies have assessed acculturation using unidimensional indicators such as place of birth, length of residency, or language. Although reasonable proxies, these indicators often lack a clear theoretical basis, and multidimensional measures of acculturation can have advantages over global measures (Salant and Lauderdale, 2003).

Theoretically, increased acculturation should be a risk factor when a health risk behavior is more prevalent in the host culture relative to the culture of origin. When the reverse is true, acculturation may serve as a protective influence (Abraído-Lanza et al., 2005). Epidemiological data suggest the possibility that acculturation may have different influences on alcohol use across Asian subgroups. Historically, rates of AUDs are lower in China and Taiwan than in the United States (Helzer et al., 1990; Wei et al., 1999). One study reported that the lifetime prevalence of DSM-III alcohol dependence in China/Taiwan was 1%–2% (Helzer et al., 1990), whereas more recent studies from this region estimate the point-prevalence of DSM-III alcohol dependence at 3%–4%, consistent with ongoing increases in alcohol consumption (Hao et al., 2004; Wei et al., 1999). Rates of lifetime alcohol dependence in the United States are historically greater than those found in China and have been estimated at 9.2% using DSM-III criteria (Helzer et al., 1990) and 5.4% using DSM-IV criteria (Kessler et al., 2005). Collectively, these findings suggest that acculturation should be associated with increased drinking rates among Chinese Americans.

Rates of AUDs in Korea generally exceed those found in most Westernized countries (Hahn and Cho, 2005), a finding that appears largely attributable to especially high rates of heavy drinking among Korean men. In the aforementioned cross-national study (Helzer et al., 1990), lifetime prevalence of a DSM-III AUD was 23% in Korea (with 43% of Korean men and 3% of Korean women meeting criteria) versus 17% in the United States (Helzer et al., 1990). More recent surveys in Korea report lifetime AUD rates ranging from 15% to 17% (26%–28% for men and 4%–6% for women) using DSM-IV criteria (Cho et al., 2007; Hahn and Cho, 2005). In these studies, lifetime prevalence of alcohol dependence was 8%–10%, a figure higher than was reported in the U.S. National Comorbidity Survey Replication study (Kessler et al., 2005). It is also demonstrated that rates of alcohol use among homeland Koreans exceed those of Korean Americans (Song et al., 2004; Weather-spoon et al., 2001). Overall, these data imply that acculturation might correspond with decreased drinking rates among Korean Americans; however, gender differences suggest this effect may be specific to men. Although cross-cultural comparisons are subject to important caveats, including differences in cohorts, sampling methodologies, and diagnostic criteria across studies, existing epidemiological data support the notion that the influence of acculturation on drinking may vary among Chinese Americans versus Korean Americans.

The aim of this study was to contribute to the presently limited literature on alcohol use in Asian-American young adults by examining interactive effects of ethnicity, acculturation, and gender on drinking behavior. Consistent with previous research, we hypothesized that Korean ethnicity and male gender would predict increased alcohol use. Based on epidemiological data from Asia and the United States, we also predicted that the effects of acculturation would vary by ethnicity and gender. Specifically, we expected that acculturation would be a risk factor for Chinese Americans and a protective factor for Korean Americans. However, because disparities in AUD rates between the United States and Korea appear largely specific to men, we predicted that any protective effect of acculturation would be limited to Korean-American men. These predictions anticipate a two-way interaction of ethnicity and acculturation and a three-way interaction of ethnicity, acculturation, and gender.

Method

Participants

Participants were Asian-American undergraduates who were recruited through introductory psychology courses and received course extra credit for participation. Recruitment flyers stipulated 100% East Asian heritage (Chinese, Korean, or Japanese) as an inclusion criterion. Because a broader aim of this study was to elicit information about participants' experiences while under the influence of alcohol, a second inclusion criterion was lifetime alcohol

consumption (i.e., one or more drinks consumed in a lifetime). The current analyses include those individuals who reported entirely Chinese or Korean heritage, as the number of respondents reporting Japanese heritage was small. The resultant sample ($N = 220$) was 51% Chinese American and 61% female, with a mean (SD) age of 19.2 years (1.45). Roughly half of the sample (50.5%) were first-generation Americans. Twelve percent reported being raised exclusively in Asia, 37% reported being raised exclusively in the United States, and the remainder reported having lived in both locations.

Measures

Recent alcohol consumption was measured with the Daily Drinking Questionnaire (DDQ; Collins et al., 1985), which assesses drinking quantity, frequency, and duration (i.e., time spent drinking). The DDQ has good reliability and validity among college populations (Baer, 1993). Six dependent variables derived from the DDQ were examined in the present analyses. Participants reported the maximum number of drinks they had consumed on any one occasion in the past month and the average number of drinks they consumed on a given weekend night in the past month. For each of these referents, participants also estimated the number of hours spent drinking. Drinking frequency in the past month was assessed using a 0–6 scale (response options were not at all, about once a month, 2–3 times a month, 1–2 times a week, 3–4 times a week, nearly every day, or once a day or more). Finally, participants' estimates of the average number of drinks consumed on each weekday during the past 3 months were used to calculate average drinks per week in the past 3 months.

Ethnicity was assessed via self-report, with participants indicating their ethnic subgroup and their percent heritage. Acculturation was assessed using the Suinn-Lew Asian Self-Identity Acculturation (SL-ASIA) scale (Suinn et al., 1987). The SL-ASIA is the most widely used method of assessing acculturation among Asian Americans (Abe-Kim et al., 2001). The measure includes 21 items assessing aspects of cultural orientation (e.g., food and language preference, generational status). Response options, ranging from 1 (low acculturation/high Asian identification) to 5 (high acculturation/high Western identification), were averaged to yield an overall acculturation score. Previous research suggests that this measure has adequate reliability and concurrent validity (Suinn et al., 1987; Suinn et al., 1992) and correlates with other indicators of acculturation (Abe-Kim et al., 2001). SL-ASIA scores were mean centered to facilitate interpretation of interactions and tests of simple slopes (Cohen et al., 2003). Internal consistency (Cronbach's α) in the present sample was .92. Participants also completed a brief questionnaire assessing demographic factors including gender, age, ethnicity, and year in college.

Procedure

Individuals who volunteered for the study reported to an assigned room. An experimenter met the participants, explained study procedures, and obtained informed consent. Participation took place in groups of 5–10 and lasted 30–45 minutes.

Results

Descriptive and contextual information

Descriptive information for drinking behavior and demographic factors is presented in Table 1. For ethnicity, there were significant differences on all drinking outcomes, with Korean Americans reporting greater quantity, frequency, and duration of drinking than Chinese Americans. Regarding gender, significant differences were found for two of the drinking outcomes. Compared with women, men reported a significantly higher number of maximum drinks in the past month and number of drinks per week in the past 3 months. The two groups did not differ in terms of acculturation or demographic characteristics.

Drinking outcomes

Drinking outcomes were evaluated using multivariate hierarchical multiple regression (Cohen et al., 2003). Six outcomes were specified as the dependent variables: (1) maximum drinks during the peak drinking episode in the past month, (2) duration of hours spent drinking during the peak drinking episode in the past month, (3) average number of drinks on weekend nights in the past month, (4) average hours spent drinking on weekend nights in the past month, (5) drinking frequency in the past month, and (6) average drinks per week in the past 3 months. Gender, ethnicity, and acculturation were entered into the model at Step 1 to test main effects. To test a moderation model evaluating potential effects on drinking outcomes as a function of gender, ethnicity, and acculturation, relevant two-way product terms (Gender $\times$ Ethnicity, Gender $\times$ Acculturation, Ethnicity $\times$ Acculturation) were entered at Step 2. Finally, the three-way product (Gender $\times$ Ethnicity $\times$ Acculturation) was entered to evaluate a potential three-way interaction at Step 3. Based on the results of the multivariate tests, univariate regression results were then examined. Diagnostic tests revealed no collinearity concerns based on tolerance values for any predictor.

Findings revealed multivariate main effects of gender, ethnicity, and acculturation on drinking outcomes at Step 1. Women, Chinese Americans, and participants higher in acculturation reported lower alcohol use relative to men, Korean Americans, and those lower in acculturation, respectively. Results at Step 2 revealed a multivariate Ethnicity $\times$ Acculturation interaction. However, there were no significant multivariate interactions for ethnicity or acculturation with gender, and the three-way interaction at Step 3 was not significant. Tests for multivariate effects are presented in Table 2.

Univariate results for peak drinking occasion

Evaluation of univariate regression results for peak drinking occasion in the past month indicated that men reported significantly more drinks relative to women, although these groups did not differ significantly in the amount of time spent drinking during this occasion. There was a significant interaction between ethnicity and acculturation, such that Korean Americans reported a lower number of maximum drinks and fewer hours spent drinking as level of acculturation increased. For Chinese Americans, acculturation appeared to have no effect on these outcomes (Table 3). Figure 1 presents estimated cell means for maximum number of drinks in the past month derived from the regression equation, where low and high values of acculturation were defined as 1 SD below and above the mean, respectively (Cohen et al., 2003). Tests of simple slopes revealed that acculturation was not significantly associated with maximum number of drinks among Chinese Americans ($\beta = .03$; $t = 0.27$, 210 df, $p = \text{ns}$). In contrast, lower acculturation was associated with consuming significantly more drinks on one's heaviest drinking occasion in the previous month for Korean Americans ($\beta = -.24$; $t = -2.64$, 210 df, $p < .01$). This pattern of results was virtually identical for number of hours spent drinking during one's peak drinking occasion. Tests of simple slopes revealed that acculturation was not significantly associated with maximum hours of drinking among Chinese Americans ($\beta = .04$; $t = 0.43$, 211 df, $p = \text{ns}$) but was significantly and negative associated with maximum hours of drinking among Korean Americans ($\beta = -.31$; $t = -3.36$, 211 df, $p < .01$).

Univariate results for weekend drinking

A significant interaction between ethnicity and acculturation was again evident when examining average hours spent drinking on weekends (see Table 3), with the pattern of the interaction being consistent with the pattern reported previously. Tests of simple slopes indicated that, among Korean-American participants, acculturation was negatively associated with the number of hours spent drinking on a typical weekend evening ($\beta = -.31$; $t = -3.44$, 209 df, $p < .01$). For Chinese Americans, acculturation had no significant association with average hours spent drinking ($\beta = .10$; $t = 1.05$, 209 df, $p = \text{ns}$).

Univariate results for overall drinking quantity/frequency

Univariate regression results were examined for drinking frequency in the past month and drinks per week in the past 3 months. Results revealed a significant main effect for gender on past-month drinking frequency, with women reporting a lower drinking frequency than men. Additionally, there was a significant main effect for ethnicity, such that Korean Americans reported higher drinking frequency in the past month and a greater number of drinks per week in the past 3 months compared with Chinese Americans. No significant interactions were found for these outcomes (see Table 3).

Discussion

This study contributes to the presently limited body of research on alcohol use among Asian-American college students by examining interactive effects of ethnicity, acculturation, and gender on drinking behavior. In contrast with most previous studies with Asian Americans (e.g., Hahm et al., 2003, 2004; Nakashima and Wong, 2000; Sue et al., 1979), we observed an inverse association of acculturation and drinking quantity/frequency. However, this effect was attributable to a protective effect of acculturation that was limited to Korean Americans. Given the little pre-existing evidence for protective effects of acculturation among Asian Americans, this finding extends previous knowledge by suggesting that acculturation is not a universal risk factor for drinking in this group.

The present findings contribute to a growing body of literature showing that relationships between acculturation and health outcomes are complex and multifaceted. These relationships often vary considerably depending on the study, acculturation index, and health behavior in question, sometimes resulting in apparently inconsistent findings (Abraído-Lanza et al., 2005; Salant and Lauderdale, 2003). Whereas most studies suggest that acculturation is a risk factor for alcohol use among Asian Americans, the present findings suggest that protective effects may also exist and may vary by ethnic subgroup. Another study of college students found evidence that acculturation was a risk factor for heavy episodic drinking among Chinese Americans but not Korean Americans (Hendershot et al., 2005). Collectively, findings from that and the current study suggest that acculturation's influence on drinking behavior can vary in these two groups, with risk and protective influences being more evident among Chinese Americans and Korean Americans, respectively.

The finding that Korean ethnicity predicted increased drinking is consistent with previous studies of U.S. community residents (Chi et al., 1989; Park et al., 1984) and college students (Luczak et al., 2001, 2003, 2004). Presumably, these findings reflect cultural differences in drinking norms and the acceptability of alcohol consumption in Korea as compared with other countries (Helzer et al., 1990; Park et al., 1984). However, it should be noted that this interpretation remains broad in the absence of measured mediators or moderators that may account for these ethnic group differences. Attempts to identify such variables have been rare but are necessary to clarify the mechanisms underlying ethnic group differences in drinking patterns.

Whereas the ethnicity effects we observed reflected epidemiological findings, the lack of Ethnicity $\times$ Gender interactions is inconsistent with the high rates of heavy drinking and AUDs observed in Korean men (Chi et al., 1989; Helzer et al., 1990; Yamamoto et al., 1994). In addition, that acculturation did not predict increased drinking among Chinese Americans is inconsistent with the lower drinking rates in China versus the United States (Helzer et al., 1990; Wei et al., 1999). Characteristics of the study sample could partly account for these findings. For instance, the high rates of alcohol use typical of college settings (Wechsler et al., 2002; Weitzman et al., 2003) could mask risk and protective influences that may otherwise discriminate among groups of Asian drinkers (e.g., Nakawatase et al., 1993). It is also important

to note that all participants in this study reported lifetime alcohol use. It is possible that this criterion selected for certain subgroups (e.g., Korean-American men and those higher in acculturation) while excluding others (e.g., Korean-American women, Chinese Americans, and those lower in acculturation) disproportionately. Such a discrepancy could have led to reduced variability in the outcome measures, thereby decreasing the likelihood of significant effects. However, exclusion of abstainers is more likely to produce a conservative test of our hypotheses than to produce spurious results.

Our focus on individuals of northeast Asian descent makes it important to consider how genetic variations particular to this population may have influenced our findings. The genes *ALDH2* and *ADH1B*, each of which code for isoenzymes that regulate alcohol metabolism, show functional variations that are prevalent among northeast Asians and that protect against alcohol dependence (Edenberg, 2007; Wall, 2005). Notably, the estimated prevalence of the protective *ALDH2**2 allele is higher among Chinese (35%–50%) than Koreans (30%–35%; Eng et al., 2007). This difference is consistent with the ethnic group difference in drinking rates in this study and could partly account for the group differences we observed. However, it is demonstrated that Korean ethnicity is a risk factor for drinking that is independent of *ALDH2* status (Luczak et al., 2001). The prevalence of the protective *ADH1B**2 allele is comparably high (approximately 90%) among both Chinese and Koreans (Eng et al., 2007), making it less likely that *ADH1B* variations would account for the ethnic differences observed here.

The current findings should be interpreted within the context of relative strengths and weaknesses of this study. Strengths include the use of validated measures of drinking and acculturation and the targeted recruitment of Asian subgroups to facilitate examination of ethnic group differences. Also, the multidimensional measure of acculturation used in this study has probable advantages over unidimensional proxy measures. Nonetheless, assessing acculturation on a linear scale, as we did in this study, can prevent examination of orthogonal or bicultural orientations (Abe-Kim et al., 2001). Other limitations include the use of a cross-sectional design, the lack of information about possible genetic influences, and our focus on lifetime drinkers. Finally, other studies (Hahm et al., 2003, 2004) found that the effects of acculturation on drinking were mediated or moderated by psychosocial factors that were not assessed in this study. Therefore, the findings reported here could differ when examined in other cohorts or in the context of other psychosocial influences.

The present findings support the argument that researchers should attend to heterogeneity in substance-use behavior across Asian-American subgroups (Price et al., 2002; Wong et al., 2004). Reported prevalence rates may be inaccurate when subgroups are examined in aggregate, potentially resulting in misleading statistics and the failure to identify subgroups with relatively greater treatment needs (Wong et al., 2004). The current findings also extend previous research by suggesting that risk and protective influences for alcohol use can vary across subgroups. Additional research on subgroup-specific risk and protective factors could ultimately inform the design of tailored interventions. Finally, the present results suggest that acculturation is not a universal risk factor for drinking among Asian Americans. Continued research is needed to clarify the conditions under which acculturation promotes increased or decreased risk for alcohol use. There is consensus that efforts are needed to identify the mechanisms by which acculturation influences health outcomes (Abraído-Lanza et al., 2005; Hahm et al., 2004; Salant and Lauderdale, 2003; Song et al., 2004). The use of prospective designs and examination of mediating and moderating variables in future studies will likely aid in clarifying these processes.

References

- Abe-Kim J, Okazaki S, Goto SG. Unidimensional versus multidimensional approaches to the assessment of acculturation for Asian American populations. *Cultur. Divers. Ethnic Minor. Psychol* 2001;7:232–246. [PubMed: 11506070]
- Abraído-Lanza AF, Chao MT, Flórez KR. Do healthy behaviors decline with greater acculturation? Implications for the Latino mortality paradox. *Soc. Sci. Med* 2005;61:1243–1255. [PubMed: 15970234]
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-III)*. Washington, DC: 1980.
- American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*. Washington, DC: 1994.
- Au JG, Donaldson SI. Social influences as explanations for substance use differences among Asian-American and European-American adolescents. *J. Psychoact. Drugs* 2000;32:15–23.
- Baer, JS. Etiology and secondary prevention of alcohol problems with young adults. In: Baer, JS.; Marlatt, GA.; MacMahon, J., editors. *Addictive Behaviors Across the Lifespan: Prevention, Treatment, and Policy Issues*. Thousand Oaks, CA: Sage; 1993. p. 111–137.
- Chi I, Lubben JE, Kitano HHL. Differences in drinking behavior among three Asian-American groups. *J. Stud. Alcohol* 1989;50:15–23. [PubMed: 2927118]
- Cho MJ, Kim J-K, Jeon HJ, Suh T, Chung I-W, Hong JP, Bae J-N, Lee D-W, Park J-I, Cho S-J, Lee C-K, Hahm B-J. Lifetime and 12-month prevalence of DSM-IV psychiatric disorders among Korean adults. *J. Nerv. Ment. Dis* 2007;195:203–210. [PubMed: 17468679]
- Cohen, J.; Cohen, P.; West, S.; Aiken, L. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. 3rd Edition. Mahwah, NJ: Lawrence Erlbaum; 2003.
- Collins RL, Parks GA, Marlatt GA. Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *J. Cons. Clin. Psychol* 1985;53:189–200.
- Edenberg HJ. The genetics of alcohol metabolism: Role of alcohol dehydrogenase and aldehyde dehydrogenase variants. *Alcohol Res. Hlth* 2007;30:5–7. 9–13.
- Eng MY, Luczak SE, Wall TL. ALDH2, ADH1B, and ADH1C genotypes in Asians: A literature review. *Alcohol Res. Hlth* 2007;30:22–27.
- Grant BF, Dawson DA, Stinson FS, Chou SP, Dufour MC, Pickering RP. The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991–1992 and 2001–2002. *Drug Alcohol Depend* 2004;74:223–234. [PubMed: 15194200]
- Hahm BJ, Cho MJ. Prevalence of alcohol use disorder in a South Korean community: Changes in the pattern of prevalence over the past 15 years. *Social Psychiat. Epidemiol* 2005;40:114–119.
- Hahm HC, Lahiff M, Guterman NB. Acculturation and parental attachment in Asian-American adolescents' alcohol use. *J. Adolesc. Hlth* 2003;33:119–129.
- Hahm HC, Lahiff M, Guterman NB. Asian American adolescents' acculturation, binge drinking, and alcohol- and tobacco-using peers. *J. Commun. Psychol* 2004;32:295–308.
- Hao W, Su Z, Liu B, Zhang K, Yang H, Chen S, Biao M, Cui C. Drinking and drinking patterns and health status in the general population of five areas of China. *Alcohol Alcsm* 2004;39:43–52.
- Harachi TW, Catalano RF, Kim S, Choi Y. Etiology and prevention of substance use among Asian American youth. *Prev. Sci* 2001;2:57–65. [PubMed: 11519375]
- Helzer JE, Canino GJ, Yeh E-K, Bland RC, Lee CK, Hwu HG, Newman S. Alcoholism—North America and Asia: A comparison of population surveys with the Diagnostic Interview Schedule. *Arch. Gen. Psychiat* 1990;47:313–319. [PubMed: 2322082]
- Hendershot CS, MacPherson L, Myers MG, Carr LG, Wall TL. Psychosocial, cultural and genetic influences on alcohol use in Asian American youth. *J. Stud. Alcohol* 2005;66:185–195. [PubMed: 15957669]
- Higuchi S, Parrish KM, Dufour MC, Towle LH, Harford TC. Relationship between age and drinking patterns and drinking problems among Japanese, Japanese-Americans, and Caucasians. *Alcsm Clin. Exp. Res* 1994;18:305–310.

- Johnson RC, Nagoshi CT, Ahern FM, Wilson JR, Yuen SH. Cultural factors as explanations for ethnic group differences in alcohol use in Hawaii. *J. Psychoact. Drugs* 1987;19:67–75.
- Keefe K, Newcomb MD. Demographic and psychosocial risk for alcohol use: Ethnic differences. *J. Stud. Alcohol* 1996;57:521–530. [PubMed: 8858549]
- Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch. Gen. Psychiat* 2005;62:593–602. [PubMed: 15939837]
- Lu Z-P, Engs RC, Hanson DJ. The drinking behaviors of a sample of university students in Nanning, Guangxi Province, People's Republic of China. *Subst. Use Misuse* 1997;32:495–506.
- Luczak SE, Corbett K, Oh C, Carr LG, Wall TL. Religious influences on heavy episodic drinking in Chinese-American and Korean-American college students. *J. Stud. Alcohol* 2003;64:467–471. [PubMed: 12921188]
- Luczak SE, Wall TL, Cook TA, Shea SH, Carr LG. ALDH2 status and conduct disorder mediate the relationship between ethnicity and alcohol dependence in Chinese, Korean, and white American college students. *J. Abnorm. Psychol* 2004;113:271–278. [PubMed: 15122947]
- Luczak SE, Wall TL, Shea SH, Byun SM, Carr LG. Binge drinking in Chinese, Korean, and white college students: Genetic and ethnic group differences. *Psychol. Addict. Behav* 2001;15:306–309. [PubMed: 11767261]
- Nakashima J, Wong MM. Characteristics of alcohol consumption, correlates of alcohol misuse among Korean American adolescents. *J. Drug Educ* 2000;30:343–359. [PubMed: 11092153]
- Nakawatase TV, Yamamoto J, Sasao T. The association between fast flushing response and alcohol-use among Japanese-Americans. *J. Stud. Alcohol* 1993;54:48–53. [PubMed: 8355499]
- Newcomb MD, Bentler PM. Substance use and ethnicity: Differential impact of peer and adult models. *J. Psychol* 1986;120:83–95. [PubMed: 3488395]
- Park JY, Huang Y-H, Nagoshi CT, Yuen S, Johnson RC, Ching CA, Bowman KS. The flushing response to alcohol use among Koreans and Taiwanese. *J. Stud. Alcohol* 1984;45:481–485. [PubMed: 6521472]
- Price RK, Risk NK, Wong MM, Klinge RS. Substance use and abuse by Asian Americans and Pacific Islanders: Preliminary results from four national epidemiologic studies. *Publ. Hlth Rep* 2002;117 Suppl. No. 1:S39–S50.
- Salant T, Lauderdale DS. Measuring culture: A critical review of acculturation and health in Asian immigrant populations. *Social Sci. Med* 2003;57:71–90.
- So DW, Wong FY. Alcohol, drugs, and substance use among Asian-American college students. *J. Psychoact. Drugs* 2006;38:35–42.
- Song YJ, Hofstetter CR, Hovell MF, Paik HY, Park HR, Lee J, Irvin V. Acculturation and health risk behaviors among Californians of Korean descent. *Prev. Med* 2004;39:147–156. [PubMed: 15207996]
- Sue S, Zane N, Ito J. Alcohol drinking patterns among Asian and Caucasian Americans. *J. Cross-Cult. Psychol* 1979;10:41–56.
- Suinn RM, Ahuna C, Khoo G. The Suinn-Lew Asian Self-Identity Acculturation Scale: Concurrent and factorial validation. *Educ. Psychol. Meas* 1992;52:1041–1046.
- Suinn RM, Rickard-Figueroa K, Lew S, Vigil P. The Suinn-Lew Asian Self-Identity Acculturation Scale: An initial report. *Educ. Psychol. Meas* 1987;47:401–407.
- Wall TL. Genetic associations of alcohol and aldehyde dehydrogenase with alcohol dependence and their mechanisms of action. *Therapeut. Drug Monit* 2005;27:700–703.
- Weatherspoon AJ, Park JY, Johnson RC. A family study of homeland Korean alcohol use. *Addict. Behav* 2001;26:101–113. [PubMed: 11196283]
- Wechsler H, Dowdall GW, Maenner G, Gledhill-Hoyt J, Lee H. Changes in binge drinking and related problems among American college students between 1993 and 1997: Results of the Harvard School of Public Health College Alcohol Study. *Amer. J. Publ. Hlth* 1998;47:57–68.
- Wechsler H, Lee JE, Kuo M, Seibring M, Nelson TF, Lee H. Trends in college binge drinking during a period of increased prevention efforts: Findings from 4 Harvard School of Public Health College Alcohol Study surveys: 1993–2001. *J. Amer. Coll. Hlth* 2002;50:203–217.

- Wei H, Derson Y, Shuiyuan X, Lingjiang L, Yalin Z. Alcohol consumption and alcohol-related problems: Chinese experience from six area samples, 1994. *Addiction* 1999;94:1467–1476. [PubMed: 10790899]
- Weitzman ER, Nelson TF, Wechsler H. Taking up binge drinking in college: The influences of person, social group, and environment. *J. Adolesc. Hlth* 2003;32:26–35.
- Wong MM, Klinger RS, Price RK. Alcohol, tobacco and other drug use among Asian American and Pacific Islander adolescents in California and Hawaii. *Addict. Behav* 2004;29:127–141. [PubMed: 14667425]
- Yamamoto J, Rhee S, Chang DS. Psychiatric disorders among elderly Koreans in the United States. *Commun. Ment. Hlth J* 1994;30:17–27.
- Zane, NWS.; Huh-Kim, J. Addictive behaviors. In: Lee, LC.; Zane, NWS., editors. *Handbook of Asian American Psychology*. Thousand Oaks, CA: Sage; 1998. p. 527-554.
- Zane, NWS.; Kim, JH. Substance use and abuse. In: Zane, NWS.; Takeuchi, DT.; Young, KNJ., editors. *Confronting Critical Health Issues of Asian and Pacific Islander Americans*. Thousand Oaks, CA: Sage; 1994. p. 316-346.
- Zane, N.; Mak, W. Major approaches to the measurement of acculturation among ethnic minority populations: A content analysis and an alternative empirical strategy. In: Chun, KM.; Organista, PB.; Marin, G., editors. *Acculturation: Advances in Theory, Measurement, and Applied Research*. Washington, DC: American Psychological Assn; 2003. p. 39-60.

FIGURE 1.
Maximum number of drinks (past month) as a function of ethnicity and acculturation

TABLE 1

Demographic information and drinking behavior, by ethnicity and gender

Variable	Ethnicity	
	Korean (<i>n</i> = 108)	Chinese (<i>n</i> = 112)
Gender, <i>n</i> (% female)	65 (60.7%)	69 (62.2%)
Age, mean (SD)	19.16 (1.28)	19.02 (2.35)
Acculturation		
SL-ASIA score, mean (SD)	2.69 (0.63)	2.73 (0.62)
Generational status, <i>n</i> (%)		
1st generation	50 (46.3%)	61 (54.5%)
2nd generation	52 (48.1%)	43 (38.4%)
3rd generation or higher	5 (4.6%)	8 (4.5%)
Unknown/unsure	1 (0.9%)	3 (2.7%)
Drinking outcomes, mean (SD)		
Peak occasion: no. of drinks [‡]	5.61 (6.01)	2.94 (2.92)
Peak occasion: no. of hours [‡]	3.17 (2.05)	2.36 (1.46)
Drinks, weekends [‡]	3.76 (4.73)	1.70 (2.74)
Hours, weekends *	3.10 (2.36)	1.98 (1.34)
Drinking frequency, days *	1.62 (1.22)	1.30 (1.12)
Drinks per week [‡]	6.01 (8.94)	3.02 (4.77)
	Gender	
	Male (<i>n</i> = 85)	Female (<i>n</i> = 134)
Drinking outcomes, mean (SD)		
Peak occasion: no. of drinks *	5.40 (6.43)	3.53 (3.41)
Peak occasion: no. of hours	2.93 (2.10)	2.63 (1.63)
Drinks, weekends	2.87 (4.38)	2.64 (3.72)
Hours, weekends	2.69 (2.17)	2.45 (1.88)
Drinking frequency, days	1.55 (1.26)	1.43 (1.16)
Drinks per week *	6.14 (10.39)	3.53 (4.03)

Note: SL-ASIA = Suinn-Lew Asian Self-Identity Acculturation.

* $p < .05$;

[‡] $p < .01$;

[‡] $p < .001$.

TABLE 2

Multivariate tests of drinking outcomes as a function of gender, ethnicity, and acculturation

Predictor	Hypothesis			
	Wilks' λ	df	Error df	<i>F</i>
Step 1				
Gender (G)	.93	6	202	2.73 [†]
Ethnicity (E)	.89	6	202	4.00 [‡]
Acculturation (A)	.94	6	202	2.25 [*]
Step 2				
G $\times$ E	.96	6	199	1.41
G $\times$ A	.96	6	199	1.48
E $\times$ A	.93	6	199	2.50 [*]
Step 3				
G $\times$ E $\times$ A	.98	6	198	0.63

Note: $N = 211$.^{*}
 $p < .05$;[†]
 $p < .01$;[‡]
 $p < .001$.

TABLE 3

Univariate tests of parameter estimates evaluating drinking outcomes as a function of gender, ethnicity, and acculturation

Predictor	Dependent variable											
	Peak drinks (n = 217)			Peak hours (n = 218)			Weekend drinks (n = 217)			Weekend hours (n = 216)		
	β	t		β	t		β	t		β	t	
Step 1												
Gender (G)	.19	2.93 [†]		.08	1.26		.03	0.42		.06	0.89	
Ethnicity (E)	.27	4.23 [‡]		.22	3.41 [‡]		.26	3.90 [‡]		.28	4.29 [‡]	
Acculturation (A)	-.11	-1.68		-.13	-1.98 [*]		-.03	-0.39		-.11	-1.66	
Step 2												
G × E	.08	0.81		.08	0.78		-.06	-0.58		-.03	-0.31	
G × A	-.05	-0.63		.10	1.19		-.02	-0.22		.06	0.71	
E × A	-.19	-2.05 [*]		-.25	-2.67 [†]		-.16	-1.69		-.29	-3.15 [†]	
Step 3												
G × E × A	-.20	-1.77		-.12	-1.03		-.13	-1.11		-.12	-1.02	

*
p < .05;

†
p < .01;

‡
p < .001.