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Religiosity and substance use among Asian American college students: moderated effects of race and acculturation

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Abstract

Background—Religiosity is a well-established protective factor against substance use among Caucasians, but limited research has examined its role among Asian Americans. The purposes of this study were (1) to examine whether the associations between religiosity and substance use outcomes differed across Caucasians and Asian Americans, and (2) to test whether acculturation moderated the associations between religiosity and substance use outcomes among Asian Americans.

Method—We utilized a large and diverse cross-sectional sample of 839 college students to test whether race moderated the associations between religiosity and substance use outcomes (Study 1). We then replicated and extended our findings in a separate college sample of 340 Asian Americans, and examined the moderating role of acculturation on the associations between religiosity and substance use outcomes (Study 2).

Results—Controlling for age, gender, and paternal education, religiosity was protective against alcohol use, alcohol problems, and marijuana use among Caucasians but was unrelated to these outcomes among Asian Americans in Study 1. In Study 2, religiosity was protective against

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Contributors

Data used in this manuscript were collected by Dr. King (Study 1) and Mr. Luk (Study 2). Mr. Luk initiated this paper, analyzed the data, and wrote the first draft of the manuscript. Ms. Emery conducted literature searches and assisted in writing the introduction. Mr. Karyadi assisted in data analyses and provided detailed edits to the manuscript. Drs. Patock-Peckham and King provided conceptual guidance and detailed edits to the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of Interest

The authors declare that they have no conflict of interest.

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alcohol problems only at high levels of acculturation. Moreover, religiosity was protective against marijuana use at both high and mean levels of acculturation, but not at low levels of acculturation.

Conclusions—The protective effects of religiosity on alcohol use and problems varied across Caucasian and Asian American college students, and religiosity protected against alcohol problems and marijuana use only among more acculturated Asian Americans. These findings underscore the need to examine culturally-specific correlates of substance use outcomes among Asian Americans.

Keywords

Religiosity; Acculturation; Alcohol Problems; Marijuana Use; Asian American

1. INTRODUCTION

Religiosity has been inversely associated with substance use in adolescents (Cotton et al., 2006; Miller et al., 2000), college students (Baer, 2002; Engs et al., 1996; Patock-Peckham et al., 1998), and adults (Kendler et al., 2003; Michalak et al., 2007). Religiosity protects against alcohol use by increasing negative beliefs about alcohol use (Johnson et al., 2008) and by reducing perceived social norms associated with alcohol use (Chawla et al., 2007). Religiosity has also been indirectly associated with less frequent substance use via higher self-control or lower tolerance for deviance (Walker et al., 2008). Moreover, religiosity buffers against the adverse effects of life stress and poor social support on adolescent substance use (Brown et al., 2008; Wills et al., 2003).

The religiosity-substance use relation might be moderated by race (Park et al., 2001; Steinman et al., 2008). Even though a recent meta-analysis indicated a stronger negative correlation between religiosity/spirituality and substance use in white versus non-white individuals (Yonker et al., 2011), most existing research has focused only on racial differences across Caucasians and African Americans (Brown et al., 2001; Christian and Barbarin, 2001; Heath et al., 1999). Generally, African Americans are more likely to abstain from substance use and are more religious than Caucasians (Wallace et al., 2003), but the protective effects of religiosity against substance use are smaller among African Americans relative to Caucasians (Amey et al., 1996; Wallace et al., 2007). These findings suggest the effects of religiosity might not be generalizable across different racial groups. As religion is a culturally embedded phenomenon (Haber and Jacob, 2007), it is important to understand the extent to which religiosity protects against substance use among Asian Americans.

1.1. Prevalence and Correlates of Substance Use among Asian Americans

Asian Americans are less likely to engage in substance use behaviors, including alcohol and marijuana use, as compared to Caucasians (SAMHSA, 2011). However, due to the overall low prevalence, specific Asian subgroups that are at higher risk for substance use may not be identified (Choi, 2008; Nagasawa et al., 2000; Tosh and Simmons, 2007; Yang and Solis, 2002). Specifically, since Asian Americans are often collapsed into the “other” category in large-scale national surveys (Eaton et al., 2010; Johnston et al., 2011), Asian American substance use remains an understudied area of research (Harachi et al., 2001).

Multiple biological, cognitive, and psychosocial factors may protect Asian American youth and college students from substance use (Hendershot et al., 2005). For example, Asian Americans who possess the *ALDH2**2 allele reported lower levels of drinking (Wall et al., 2001). This allele endows individuals with greater sensitivity to the toxic effects of alcohol, thereby reducing alcohol use and problems (Hendershot et al., 2009a, 2009b). Moreover, the

protective effect of this allele is mediated by cognitive factors such as drinking motives and alcohol expectancies (Hendershot et al. 2009a, 2009b).

Psychosocial factors might also protect Asian Americans against substance use. For example, Asian Americans perceived higher negativity from parents and friends toward drinking, and expected greater costs and fewer benefits from drinking compared to Caucasians (Keefe and Newcomb, 1996). Additional psychosocial protective factors that are common among Asian Americans include high academic achievement, intact family structure, and fewer substance using adult or peer role models (Au and Donaldson, 2000; Makimoto, 1998; Thai et al., 2010). Overall, the lower rates of substance use among Asian Americans may be partly attributed to higher levels of biological, cognitive, and psychosocial protective factors experienced by Asian Americans relative to Caucasians.

1.2. Religiosity, Cultural Context, and Substance Use

Limited research has tested whether religiosity is another psychosocial factor that protects Asian Americans from substance use. Religiosity has been shown to protect against alcohol involvement among Korean Americans (Lubben et al., 1989), but provides less protection among Chinese Americans (Chi et al., 1998, 1989). Similarly, religious service attendance is protective against heavy episodic drinking among Korean Americans and Chinese Americans who are affiliated with a Western religion (Luczak et al., 2003). The inverse religiosity-alcohol use association among Korean Americans may be partly explained by religious discouragement of excessive drinking (Ayers et al., 2009). However, this inverse association appears to be less consistent among Asian Americans than Caucasians, and may be moderated by Asian ethnic subgroup and religious affiliation.

The effect of religiosity should be interpreted within the broader cultural context (Haber and Jacob, 2007; Zhai and Stokes, 2009). Some studies suggested that the inverse association between religiosity and psychological adjustment is especially salient when religiosity at the societal level is high (e.g., Lavri and Flere, 2008), or when religiosity is more valued by members of a particular culture (e.g., Gebauer et al., 2012). Other studies emphasized the importance of cultural factors such as individualism and collectivism (Markus and Kitayama, 1991; Triandis et al., 1990). Within an individualistic western cultural context, religiosity protects against substance use because it connects individuals to a larger religious group, which may alter their social norms and reinforce negative beliefs about substance use (Chawla et al., 2007; Johnson et al., 2008; Walker et al., 2008). Furthermore, religious Caucasian individuals may find additional resources to cope with life stressors and may receive social support from their religious community (Brown et al., 2008; Wills et al., 2003). However, among Asian Americans, these same protective effects may be pre-existing within the collectivistic cultural context. While prior research supported the protective role of collectivistic cultural orientation on substance use behaviors (e.g., Johnson, 2007; Le et al., 2009), this effect may be confounded by the role of religiosity, which may then render a weaker association between religiosity and substance use in Asian Americans relative to Caucasians.

Furthermore, according to Gfroerer and Tan (2003), immigrated individuals who have lived in the United States for longer periods of time are more likely to develop substance use mirroring those of the general population. Accordingly, acculturation has been positively associated with substance use among Asian Americans (Hahm et al., 2004; Hong et al., 2011; Hussey et al., 2007; Thai et al., 2010). This increase in substance use is in part attributable to the effects of acculturation, which can be defined as changes caused by contact with culturally dissimilar people and social influences (Gibson, 2001). Such acculturation may interact with other variables to predict alcohol use and problems among Asian Americans. For example, adolescents who reported high levels of acculturation and

low levels of parental attachment were at the greatest risks for any past year alcohol use (Hahm et al., 2003). Perceived discrimination and lower religious participation are also related to greater heavy drinking among U.S. born but not foreign-born individuals (Kim and Spencer, 2001).

Similarly, as Asian Americans become more culturally “American,” the effects of religiosity on substance use may begin to mirror its effects among Caucasians. However, no prior study has examined whether acculturation would moderate the associations between religiosity and substance use outcomes among Asian Americans. As Asian Americans become more acculturated, the protective effect of religiosity against substance use may become stronger due to the loss of specific collectivistic aspects of their cultural heritage, which may have protected them from substance use before they became acculturated to American culture. Moreover, as Asian Americans become more acculturated, religiosity may replace the role of collectivism and consequently prevent Asian Americans from engaging in substance use by activating cognitive and psychosocial mediating factors buffering against substance use.

Finally, most prior studies on Asian American substance use have typically focused on alcohol-related outcomes (e.g., Hendershot et al., 2005, 2009a, 2009b) and have not considered whether correlates of alcohol involvement can be generalized to predict marijuana use. Racial/ethnic differences in rates of change of marijuana use have been shown to be smaller than rates of change of alcohol use and heavy drinking (Chen and Jacobson, 2012). In an ethnically diverse sample, adolescent effortful control predicted progression to marijuana use but not progression to alcohol use (Piehler et al., 2012). Taken together, these studies suggest that the development and correlates of alcohol involvement and marijuana use are not necessarily identical among diverse populations. This highlights the importance of considering marijuana use as a distinct outcome in the current study.

1.3. The Scope of the Current Study

This study addressed existing gaps in the literature using two separate college student samples. In Study 1, we tested whether the effects of religiosity on substance use differed across Caucasian and Asian American college students. In Study 2, we examined whether the protective effects of religiosity on substance use was moderated by acculturation among Asian American college students. Three substance use variables, including alcohol use, alcohol problems, and marijuana use, were examined in separate regression models. We hypothesized that the effects of religiosity on substance use variables would be stronger among Caucasians compared to Asian Americans (Study 1), and stronger among more acculturated Asian Americans compared to less acculturated Asian Americans (Study 2).

2. METHOD

2.1. Participants

In Study 1, we collected data from 550 Caucasian and 289 Asian American college students who completed a computerized survey in our laboratory. In Study 2, we collected data from 343 Asian Americans who completed self-report questionnaires through a web-based survey. The final sample size for Study 2 was 340 since we excluded 3 influential outliers in the final analyses. (In the initial regression models ($n = 343$), acculturation moderated the association between religiosity and alcohol problems ($\beta = -.12, p = .026$), and the association between religiosity and marijuana use ($\beta = -.11, p = .039$). Due to the low prevalence rates of alcohol problems and marijuana use among Asian Americans, we conducted outlier analyses to evaluate the possibility that the interaction effects in Study 2 were driven by a few influential outliers. Based on model residuals, Cook’s distance, and centered leverage, we identified 10 influential outliers for each model. We conducted analyses without these 10 influential outliers and obtained similar significant interaction

effects on alcohol problems ($\beta = -.14$, $p = .014$) and marijuana use ($\beta = -.12$, $p = .038$). Upon close examination of outliers, we found one participant who tended to choose the same response option for all items on the same measure (e.g., choosing the same response for all alcohol problem items). We also detected two other participants who scored unusually high on both model residuals and Cook's distance (probably due to unusually high levels of substance use, such as reporting drinking both beer/wine and hard liquor *every day* in the past year, usually had 5 drinks of beer/wine *and* 5 drinks of hard liquor per occasion). Due to these characteristics, we decided to delete these 3 participants from the final analytic sample. As shown in text, we obtained similar interaction effects after the removal of these outliers.)

All participants were enrolled in lower level psychology courses at the University of Washington and received course credit for their participation. Sample characteristics are presented in Table 1.

2.2. Measures

All participants reported on their age, gender, race, and paternal education. Paternal education was coded on a scale from (0) "8th grade or less" to (10) "Graduate/professional degree." In Study 2, participants also reported their country of birth and Asian ethnic subgroup (e.g., Chinese, Korean, Vietnamese, etc.). In both Studies 1 and 2, participants were asked to report their religious affiliation, although the question used was slightly different. Major religious affiliation categories, such as Catholic, Protestant, unaffiliated, and atheist/agnostic, were listed.

In Study 1, religiosity was measured by a single item in which participants were asked to rate how important religion was in their day to day life. Response options ranged from (0) "Unimportant" to (3) "Extremely important." In Study 2, we used 28 items from the Brief Multidimensional Measure of Religiousness/Spirituality (BMMRS; Fetzer Institute and National Institute on Ageing, 1999) to measure religiosity. We selected these 8 dimensions of religiosity/spirituality based on prior research indicating a significant inverse association between substance use and each of these dimensions, including daily spiritual experiences (6 items; Desrosiers and Miller, 2008; $\alpha = .97$), values and beliefs (2 items; Sutherland and Shepherd, 2001; $\alpha = .72$), forgiveness (3 items; Knight et al., 2007; $\alpha = .80$), private religious practices (5 items; Nonnemakera et al., 2003; $\alpha = .89$), religious and spiritual coping (4 items; Cotton et al., 2006; $\alpha = .93$), religious support (4 items; Cotton et al., 2006; $\alpha = .82$), organized religion (2 items; Bahr et al., 1998; $\alpha = .86$), and overall self-rating of religiosity/spirituality (2 items; Kendler et al., 2003; $\alpha = .85$). Sample items included: "I find strength and comfort in my religion" and "I look to God for strength, support, and guidance". We used the response options provided in the original BMMRS and added a N/A option for those who found these statements non-applicable to them. We first created a mean score for each of these 8 subscales. Because all these subscales were moderately to highly correlated ($r = .43 - .89$), we computed a mean of these subscale scores to represent religiosity, with a higher score indicating higher levels of religiosity. We treated N/A responses as missing data. Subsequent analyses were conducted to compare whether these participants differed on demographic and key variables from those who did not provide a N/A response. The Cronbach's alpha for the composite religiosity variable was .92. (We conducted a confirmatory factor analysis in MPlus (Muthén and Muthén, 1998–2010) to evaluate the psychometric property of BMMRS in our Asian American only sample (Study 2). We first fitted a factor model with all eight religiosity subscales as indicators of an underlying religiosity latent factor (chi square = 108.325, $p < .001$; CFI = .946; TLI = .924; RMSEA = .113). The model modification indices for this model suggested the existence of residual correlation between the organized religion and private religious practices. We then fitted a revised factor model which allowed organized religion and private religious

practices to correlate. This revised factor model fitted the data well (chi square = 58.124, $p < .001$; CFI = .976; TLI = .965; RMSEA = .077). To avoid alpha inflation by running multiple models or multicollinearity by including moderately to highly correlated religiosity subscales in the same model, we chose a parsimonious approach by averaging across the religiosity subscales and use a single religiosity score for the rest of the analyses.)

Acculturation was assessed only among participants in Study 2. A total of 21 items from the original Suinn-Lew Asian Self Identity Acculturation Scale (Suinn et al., 1992) were used to assess participants' level of acculturation. Sample items inquired what language they preferred to use and where participants had been raised. Other items assessed participants' identity and origins, friends and peers, media and food preference, heritage, pride and values. All responses were rated on a five-point Likert scale. We computed a mean score to represent level of acculturation with higher scores indicating higher levels of acculturation. The alpha reliability for acculturation was .92.

All participants reported their frequency and quantity of alcohol use in the past year. We used two items to measure frequency of alcohol use (one for beer/wine and one for hard liquor) with response options ranging from (1) "Not at all" to (7) "Every day." We used two other items to measure quantity of alcohol use (one for beer/wine and one for hard liquor) in a "typical" drinking session with response options ranging from (1) "No drinks" to (9) "Nine or more drinks." We computed past year alcohol use as the sum of the products of the beer/wine quantity*frequency and the hard liquor quantity*frequency variables, and then rescaled the variable such that zero indicated no alcohol use at all in the past year.

Participants reported the frequency they experienced alcohol related negative consequences in the past year with 39 items measuring the degree to which participants experience problems related to alcohol use with 27 items derived from the Young Adult Alcohol Problems Screening Test (YAAPST; Hurlburt and Sher, 1992) and 12 items taken from Mallett et al. (2008). Response options ranged from (0) "Never or Not in the Past Year" to (1) "1 time in the past year" to (8) "40 or more times in the past year." The Cronbach's alphas for alcohol problems were .93 for Study 1 and .94 for Study 2.

In both Study 1 and Study 2, frequency of past year marijuana use was assessed using a single item, "In the past year, how many times did you use marijuana or hashish?" The response options ranged from (0) "Not at all" to (2) "2–3 times per month" to (6) "Every day."

2.3. Statistical Analysis

Analyses were conducted using SPSS 18.0. We first conducted descriptive statistics on key variables, including religiosity, acculturation, and substance use variables. To test our main hypotheses, we conducted multiple regression analyses controlling for covariates including age, gender, and paternal education (as a proxy for socioeconomic background). In Study 1, we used three separate models to test the main and interaction effects of religiosity and race on alcohol use, alcohol problems, and marijuana use. In Study 2, we tested the main and interaction effects of religiosity and acculturation on alcohol use, alcohol problems, and marijuana use in three separate models. We mean-centered religiosity and acculturation in the moderation analyses, and we probed significant interactions using simple slope analyses following Aiken and West (1991). Because a number of participants reported N/A on the religiosity items, we also conducted post-hoc *t*-tests to examine whether this biased the current sample.

3. RESULTS

3.1. Sample Characteristics

Descriptive statistics on study variables are presented in Table 1. In Study 1, independent samples *t*-tests revealed that Asian Americans ($M = 1.13$, $SD = 1.05$) reported a higher level of religiosity compared to Caucasians ($M = 0.94$, $SD = 1.02$), $t(833) = -2.58$, $p = .01$. Asian Americans also reported lower levels of substance use across all three substance use variables as compared to Caucasians, $t(831) = 3.89$, $p < .001$ (see Table 2 for M and SD by race).

3.2. Main and Interaction Effects of Religiosity and Race/Acculturation on Substance Use

In Study 1, zero-order correlations indicated religiosity was protective against alcohol use, alcohol problems, and marijuana use among Caucasians, but was only protective against marijuana use among Asian Americans (Table 2). Multiple regression analyses (Table 3) revealed a significant interaction between religiosity and race on alcohol use ($\beta = .11$, $p = .009$). The protective effect of religiosity against alcohol use was significant among Caucasians ($\beta = -.16$, $p < .001$) but non-significant among Asian Americans ($\beta = .02$, $p = .77$). We also found similar trends for the interaction between religiosity and race on alcohol problems ($\beta = .08$, $p = .06$) and marijuana use ($\beta = .08$, $p = .07$). Specifically, religiosity was protective against alcohol problems among Caucasians ($\beta = -.14$, $p = .001$) but not among Asian Americans ($\beta = -.01$, $p = .83$). Similarly, religiosity was protective against marijuana use among Caucasians ($\beta = -.20$, $p < .001$) but not among Asian Americans ($\beta = -.07$, $p = .20$).

In Study 2, we tested whether acculturation moderated the association between religiosity and substance use among 340 Asian American college students. Similar to Study 1, religiosity was only protective against marijuana use and not alcohol use and alcohol problems in zero-order correlations (Table 2). In multiple regression analyses, acculturation moderated the effect of religiosity on both alcohol problems ($\beta = -.13$, $p = .02$) and marijuana use ($\beta = -.16$, $p = .04$) but not on alcohol use (Table 3). The direct protective effect of religiosity on substance use was only significant for marijuana use ($\beta = -.13$, $p = .02$), whereas acculturation was a consistent risk factor for alcohol use, alcohol problems, and marijuana use among Asian Americans.

Simple slope analyses indicated religiosity was protective against alcohol problems at high levels of acculturation ($\beta = -.19$, $p = .02$) but was unrelated to alcohol problems at mean ($\beta = -.07$, $p = .23$) or low levels ($\beta = .06$, $p = .44$) of acculturation (Figure 1). This suggested, at high levels of acculturation, a one standard deviation increase in religiosity was associated with a .19 standard deviation decrease in alcohol problems. A similar pattern was observed in the model with marijuana use as the outcome. Religiosity was protective against marijuana use at both high ($\beta = -.24$, $p = .002$) and mean levels of acculturation ($\beta = -.13$, $p = .02$) but was unrelated to marijuana use at low levels ($\beta = .02$, $p = .74$) of acculturation (Figure 2). This suggested that a one standard deviation increase in religiosity was associated with a .28 standard deviation decrease in marijuana use at high levels of acculturation, and a .14 standard deviation decrease in marijuana use at mean levels of acculturation.

3.3. Missing Data and Zero-Inflated Regression Analyses

Because 25 participants (7.4%) reported N/A on the religiosity items in Study 2, we conducted post-hoc *t*-tests to examine whether these participants differed from those who responded to the religiosity items in terms of their demographic characteristics (i.e., age, gender, and paternal education) and levels of substance use (i.e., alcohol use, alcohol

problems, and marijuana use). All the *t*-tests were not significant at the $p = .05$ level. We also utilized censored-inflated modeling in MPlus 6.2 (Muthén and Muthén, 1998–2010) to test whether the interaction between religiosity and acculturation predicted the presence of any alcohol problem and marijuana use, and the level of alcohol problems and marijuana use. These models suggest that the religiosity by acculturation interaction was associated with the presence of (but not level of) alcohol problems, and both the presence and level of marijuana use. (We conducted follow-up analyses on the significant religiosity x acculturation effects in Study 2 using zero-inflated models (i.e., censored-inflated modeling in Mplus; Muthén and Muthén, 1998–2010). We found that the interaction between religiosity and acculturation predicted the presence of alcohol problems ($\beta = .351, p < .001$) but was not related to the level of alcohol problems among those who reported alcohol problems ($\beta = -.062, p = .343$). Conversely, the interaction between religiosity and acculturation predicted both the presence of marijuana use ($\beta = .619, p < .001$) and the level of marijuana use among users ($\beta = .284, p = .002$).)

4. DISCUSSION

Prior research indicated that religiosity protects against alcohol use in college students (Chawla et al., 2007; Patock-Peckham et al., 1998). The present study extends existing research by testing whether these effects are generalizable to Asian Americans and whether similar patterns can be found in the prediction of marijuana use. In Study 1, we found one significant interaction and two interactions approaching significance between race and religiosity on substance use. Controlling for covariates, religiosity was inversely associated with alcohol use and alcohol problems among Caucasians but not among Asian Americans. In Study 2, we found that religiosity moderated the effect of acculturation on alcohol problems and marijuana use. These interaction effects suggest religiosity is protective against alcohol problems and marijuana use only among more acculturated Asian Americans. These findings indicate that the protective role of religiosity against substance use among Asian Americans differs by race and may be conditioned by level of acculturation.

In Study 1, zero-order correlations demonstrated that the protective effect of religiosity was significant for marijuana use but negligible for alcohol use and alcohol problems among Asian Americans. Moderation analyses suggested a significant interaction between religiosity and race, in which religiosity was inversely correlated with alcohol use among Caucasians only. Similar trends were observed for interactions predicting alcohol problems and marijuana use. These findings are consistent with prior research indicating a weaker association between religiosity and psychological outcomes in minority individuals (Amey et al., 1996; Yonker et al., 2011; Wallace et al., 2007). One possibility could be that cultural or psychosocial factors, such as acculturation, accounted for much variance in substance use among Asian Americans (Hahm et al., 2003; Le et al., 2009; Thai et al., 2010).

In Study 2, we assessed religiosity using a well validated questionnaire and included the Suinn-Lew Asian Self Identity Acculturation Scale (Suinn et al., 1992) to measure acculturation specific to Asian Americans. Our results suggest that acculturation moderated the religiosity-substance use association. Among more acculturated Asian Americans only, religiosity was protective against having any (but not level of) alcohol problems, and both the presence of any and level of marijuana use. Since religiosity was generally protective against marijuana use among Asian Americans in both Study 1 and Study 2 (as evidenced by zero-order correlations), the religiosity by acculturation effect on marijuana use suggests that acculturation to American culture enhances the effects of religiosity on marijuana use. These findings reinforce the idea that religion is a culturally embedded phenomenon (Gebauer et al., 2012; Haber and Jacob, 2007; Lavri and Flere, 2008). Asian Americans

who are more acculturated to American culture may be exposed to higher levels of psychosocial risks for alcohol problems and marijuana use. Religiosity may protect acculturated Asian Americans from alcohol problems and marijuana use by activating key mediators. For instance, religious Asian Americans may have more negative beliefs about substance use (Johnson et al., 2008) and may perceive substance use as being less normative among their peers (Chawla et al., 2007). Prospective research should examine the underlying process through which religiosity becomes protective for alcohol problems and marijuana use among Asian Americans as they become acculturated over time.

The present study has several strengths. First, we used a large sample in Study 1 and extended our findings in Study 2, which partially addressed the possibility that the non-significant associations between religiosity and substance use outcomes in Study 1 were simply due to the smaller sample size for Asian Americans. Second, we used two well-validated questionnaires to measure religiosity and acculturation in Study 2, which strengthened the inferences drawn from our analyses. Third, rather than focusing only on alcohol-related outcomes, we also included marijuana use as a key outcome variable.

Limitations of this study should also be noted. First, we relied on cross-sectional data, wherein the temporal sequence of events cannot be determined. Longitudinal research is needed to further disentangle the directions of effects. Second, as a first step to understanding the religiosity-substance use relation among Asian Americans, we conceptualized religiosity as a unidimensional construct. Future research should test whether different dimensions of religiosity (e.g., intrinsic vs. extrinsic; Allport and Ross, 1967; Gorsuch and Venable, 1983) may drive the significant association among more acculturated Asian Americans. Third, our sample size did not allow us to examine potential differences across Asian ethnic subgroups. Future research should use a larger sample and examine potential Asian ethnic subgroup differences.

The present study is the first to demonstrate that religiosity may have differential effects on substance use across Caucasians and Asian Americans and among Asian Americans with varying levels of acculturation. Our findings highlight the importance of testing the joint effects of race/acculturation and psychosocial factors on substance use among Asian Americans. Future research should examine whether acculturation interacts with other psychosocial factors in predicting substance use among Asian Americans. The identification of culturally-specific correlates of substance use may guide the development of culturally sensitive substance use interventions for Asian Americans.

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Figure 1.

Acculturation Moderated the Effect of Religiosity on Past Year Alcohol Problems in Asian American College Students (Study 2)

Note. Religiosity was protective against alcohol problems only at high levels of acculturation, but was unrelated to alcohol problems at mean or low levels of acculturation.

Figure 2. Acculturation Moderated the Effect of Religiosity on Past Year Marijuana Use in Asian American College Students (Study 2)

Note. Religiosity was protective against marijuana use at both mean and high levels of acculturation, but was unrelated to marijuana use at low levels of acculturation.

Table 1

Descriptive Statistics on Demographic and Study Variables in Studies 1 and 2

	Study 1 (n = 839)		Study 2 (n = 340)	
	Overall	Caucasians	Asian Americans	Asian Americans Only
Gender				
<i>Female</i>	448 (53.4%)	300 (54.5%)	148 (51.2%)	223 (65.6%)
Race				
<i>Asian American</i>	289 (34.4%)	--	--	340 (100%)
Country of Birth ^a				
<i>United States</i>	--	--	--	175 (51.5%)
Asian Ethnic Subgroup ^d				
Chinese	--	--	--	69 (20.3%)
Japanese	--	--	--	20 (5.9%)
Korean	--	--	--	81 (23.8%)
Taiwanese	--	--	--	22 (6.4%)
Vietnamese	--	--	--	25 (7.4%)
Mixed Ethnicity	--	--	--	28 (8.2%)
Other ^b	--	--	--	95 (27.9%)
Religious Affiliation				
Catholic	138 (16.4%)	94 (17.1%)	44 (15.2%)	54 (15.9%)
Protestant	122 (14.5%)	91 (16.5%)	31 (10.7%)	45 (13.2%)
Mormon	9 (1.1%)	7 (1.3%)	2 (.7%)	2 (.6%)
Jewish ^c	32 (3.8%)	32 (5.8%)	0 (0%)	--
Buddism ^a	--	--	--	51 (15.0%)
Hinduism ^a	--	--	--	7 (2.1%)
Muslim ^a	--	--	--	12 (3.5%)
Unaffiliated	210 (25.0%)	134 (24.4%)	76 (26.3%)	84 (24.7%)
Atheist/agnostic	140 (16.7%)	98 (17.8%)	42 (14.5%)	32 (9.4%)
Other	188 (22.4%)	94 (17.1%)	94 (32.5%)	53 (15.6%)
Age Mean (SD)	18.88 (1.11)	18.89 (1.12)	18.87 (1.08)	19.19 (1.24)
Paternal Education Mean (SD)	7.03 (2.90)	7.49 (2.56)	6.15 (3.28)	6.35 (3.26)
Religiosity ^d Mean (SD)	1.01 (1.03)	.94 (1.02)	1.13 (1.05)	1.36 (1.03)
Acculturation Mean (SD) ^a	--	--	--	1.99 (.65)
Alcohol Use				
Number of abstinence (%)	172 (20.5%)	88 (16.0%)	84 (29.1%)	139 (40.9%)
Mean (SD)	21.77 (21.23)	26.09 (22.01)	13.36 (16.71)	10.57 (14.29)
Alcohol Problems				
Number reported none (%)	226 (26.9%)	109 (19.8%)	117 (40.5%)	151 (44.4%)
Mean (SD)	.46 (.59)	.57 (.64)	.25 (.40)	.32 (.58)
Marijuana Use				

	Study 1 (n = 839)		Study 2 (n = 340)	
	Overall	Caucasians	Asian Americans	Asian Americans Only
Number reported none (%)	566 (67.5%)	332 (60.4%)	234 (81.0%)	262 (77.1%)
Mean (SD)	.69 (1.29)	.86 (1.40)	.37 (.98)	.46 (1.21)

^aThese variables were not measured in Study 1.

^bOther Asian ethnic subgroups included Cambodian (1.2%), Filipino (2.6%), Indian (4.4%), Pacific Islanders (1.7%), and other (18.0%).

^cThis religious affiliation response option was not included in Study 2.

^dStudy 1 = Importance of Religiosity (ranged from 0 to 3), Study 2 = Multi-dimensional Measure of Religiosity (ranged from 0 to 3).

Zero-Order Correlations between Religiosity and Substance Use Variables by Race in Study 1 and Zero-Order Correlations among Religiosity, Substance Use Variables, and Acculturation in Study 2

Table 2

Variables	Study 1 (<i>n</i> = 839)				
	1.	2.	3.	4.	<i>M</i> <i>SD</i>
1. Religiosity	1.00	.02	−.02	−.12 [*]	1.13 1.05
2. Alcohol Use	−.17 ^{**}	1.00	.81 ^{**}	.44 ^{**}	13.36 16.71
3. Alcohol Problems	−.14 ^{**}	.81 ^{**}	1.00	.55 ^{**}	.25 .40
4. Marijuana Use	−.19 ^{**}	.51 ^{**}	.53 ^{**}	1.00	.37 .98
<i>M</i>	.94	26.09	.57	.86	
<i>SD</i>	1.02	22.01	.64	1.40	

Variables	Study 2 (<i>n</i> = 340)					
	1.	2.	3.	4.	5.	<i>M</i> <i>SD</i>
1. Religiosity	1.00	−.06	−.05	−.13 ^{**}	−.10	1.36 1.03
2. Alcohol Use		1.00	.71 ^{**}	.48 ^{**}	.36 ^{**}	10.57 14.29
3. Alcohol Problems			1.00	.42 ^{**}	.26 ^{**}	.32 .58.
4. Marijuana Use				1.00	.30 ^{**}	.46 1.20
5. Acculturation					1.00	1.99 .65

Note.

* $p < .05$,

** $p < .01$. Intercorrelations for Caucasians are presented in **bold** below the diagonal and intercorrelations for Asian Americans are presented above the diagonal.

Table 3
Regression Analyses Testing Race (Study 1) and Acculturation (Study 2) as Putative Moderators

Variables	Alcohol Use				Alcohol Problems				Marijuana Use			
	<i>b</i>	SE	β	<i>p</i>	<i>b</i>	SE	β	<i>p</i>	<i>b</i>	SE	β	<i>p</i>
Study 1 (<i>n</i> = 839)												
Intercept	27.75	3.43		<.001	.58	.10		<.001	2.53	.21		<.001
Age	1.39	.63	.07	.027	.03	.02	.06	.097	-.09	.04	-.07	.028
Gender	-5.87	1.40	-.14	<.001	-.11	.04	-.09	.006	-.40	.09	-.16	<.000
Paternal Education	.55	.25	.07	.027	.01	.01	.06	.077	.01	.02	.03	.432
Religiosity	-3.35	.84	-.16	<.001	-.08	.02	-.14	.001	-.25	.05	-.20	<.001
Race	-12.06	1.51	-.27	<.001	-.31	.04	-.25	<.001	-.47	.09	-.17	<.001
Religiosity x Race	3.68	1.41	.11	.009	.08	.04	.08	.061	.16	.09	.08	.068
Study 2 (<i>n</i> = 340)												
Intercept	11.01	2.69		<.001	.22	.12		.059	.86	.25		.001
Age	1.70	.60	.15	.005	.06	.03	.13	.021	.05	.06	.05	.336
Gender	-4.70	1.57	-.16	.003	-.12	.07	-.10	.080	-.33	.14	-.13	.021
Paternal Education	-.13	.23	-.03	.562	.01	.01	.03	.601	-.04	.02	-.10	.068
Religiosity	-.81	.76	-.06	.292	-.04	.03	-.07	.227	-.17	.07	-.13	.017
Acculturation	7.86	1.14	.36	<.001	.24	.05	.27	<.001	.53	.10	.28	<.001
Religiosity x Acculturation	-1.52	1.12	-.07	.175	-.11	.05	-.13	.020	-.20	.10	-.11	.044