

Personal Gambling Expectancies Among Asian American and White American College Students

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Abstract Many college students are involved in gambling behavior as a recreational activity. Their involvement could potentially develop into problem gambling, an issue of increasing concern to student health. At the same time, evidence suggests that Asian Americans are overrepresented amongst problem gamblers in this age period. Research on factors related to initiation and development of problem gambling in college students is necessary to inform the development of effective and culturally-sensitive prevention efforts against gambling. The relationships between personal gambling expectancies at two levels of specificity (two general and six specific types of expectancies) and college student gambling at two levels of behavior (initiation and problems) were examined in a sample of 813 Asian American and White American college students. The study aimed to address (a) whether expectancies explained ethnic differences in gambling, (b) ethnic similarities and differences in the pattern of relationships between expectancies and gambling, and (c) whether expectancies that emerged in both ethnic groups have a greater risk or protective effect for one group than another. Results showed that Asian American students reported more problem gambling than White American students, but expectancies did not account for this group difference. Risk and protective factors for initiation were relatively similar between groups, but different patterns of risk emerged for each group for problem gambling. Implications for college primary prevention and harm reduction programs are discussed.

Keywords Gambling initiation · Problem gambling · Expectancies · Bifactor model · Asian Americans

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Introduction

Gambling is prevalent among college students, but under-recognized as a risk behavior by this population (Engwall et al. 2004). Students viewed gambling as a socially acceptable means of recreation (Stinchfield et al. 2006) that was less harmful and more available than drinking (Wickwire et al. 2007). College students are also emerging adults (Arnett 2000), undergoing a critical developmental period marked by extensive exploration of self-identity and development of personal interests. These interests often include various risk and addictive behaviors, which was reflected in higher rates of past-year gambling among emerging and young adults (78–89 %) than older adults (62–86 %) and adolescents (60–64 %) (Welte et al. 2011). Problem and pathological gambling rates among college students have increased during the past decade. Shaffer et al. (1999) reported a 7.0 % rate of problem gambling and a 5.1 % rate of pathological gambling in their meta-analysis of studies from the 1990s. Blinn-Pike et al. (2007) reported a 7.89 % [95 % CI (5.37, 10.4)] rate of pathological gambling in their more recent meta-analysis.

Problem and pathological gambling has been linked to psychological distress, impairment in school, work, and social domains, as well as comorbidity with other addictive and psychological disorders (LaBrie et al. 2003). There is a clear lack of empirically-supported prevention services against gambling, so this emerging student health issue will become more costly to schools and the larger public as legal gambling continues to expand (Petry and Blanco 2012). Even though college gambling programs could follow the prevention framework established against drinking and substance use (Dickson et al. 2002, 2004; Derevensky et al. 2005), research specifically focused on cognitive factors that contribute to initiation of gambling and the development of problem gambling is needed to inform the respective development of primary prevention and harm reduction programs specifically against gambling.

Ethnic Disparities in Problem Gambling Among Asian Americans

Problem gambling is among the very few disorders in which higher prevalence rates were consistently observed among Asian Americans in nationally-representative studies (Welte et al. 2004, 2011). Although Asian Americans participated in gambling activities at similar or even lower rates than White Americans, Asian Americans had higher rates of problem gambling even after accounting for gender, socioeconomic status, and other important covariates. Disparities in problem gambling have also been observed between Asian American and White American college students (Wong et al. 2012). The higher prevalence of problem gambling was consistent with long-standing concerns about gambling in Asian American communities (Fong et al. 2010; Jang et al. 1998). These studies provided initial evidence that important ethnic disparities between Asian Americans and White Americans existed in problem gambling.

The importance of examining ethnic disparities among Asian Americans in problem gambling is highlighted by the fact that Asian Americans reported equal or lower rates in many other major mental health and addictive disorders than White Americans. There were mixed findings between Asian Americans and White Americans in the comparative rates of anxiety, mood, and other disorders examined in the Collaborative Psychiatric Epidemiology Surveys (Gonzalez et al. 2010; Takeuchi et al. 2007) and the National Comorbidity Study (Breslau et al. 2005). Lower rates have been repeatedly observed in representative studies of Asian Americans with substance use and problems, tobacco use, binge drinking, and heavy alcohol use (Substance Abuse and Mental Health Services Administration

2011). In order to develop the scientifically-informed programs to address disparities among Asian Americans in problem gambling, it is important to understand what factors might explain ethnic differences in rates of problem gambling.

Expectancies and Gambling Behavior

Social-cognitive theory emphasized the important relationship between an individual's cognitions about a specific behavior and the behavior itself (Bandura 2004). Ethnocultural differences in gambling may be explained by cognitive factors, such as expectancies, motives, social norms, and other evaluations of gambling behavior (Raylu and Oei 2004b). Individuals from one ethnic background may view gambling as more prevalent, socially acceptable, and less risky than others from different backgrounds. More positive gambling-related cognitions related to certain ethnic backgrounds could lead some individuals to gamble more often or engage in riskier types of gambling, which is then reflected in increased problem gambling among certain ethnic groups. Research on gambling-related cognitions in various ethnic groups have examined the relationship between motives and gambling behavior (e.g., Lee et al. 2007; Stewart and Zack 2008; Wu and Tang 2011), but it does not appear that any studies have examined the explanatory effects of gambling motives on gambling behavior across ethnic groups. Similarly, ethnic differences in the effect of gambling attitudes (e.g., Moore and Ohtsuka 1999; Orford et al. 2009; Tao et al. 2011) and norms (e.g., Larimer and Neighbors 2003; Moore and Ohtsuka 1999; Wu and Tang 2012) on gambling have not been examined as explanatory factors of group differences in gambling.

More recently, expectancies have received increased attention in gambling research on different ethnic groups. Gambling expectancies are dynamic evaluations about prospective outcomes of gambling behavior (i.e., if and when an individual gambles, what is their expected outcome). Individuals can perceive that a behavior has both benefits (positive outcomes) and risks (negative outcomes) (Jessor 1987, 1991; Halpern-Felsher et al. 2004). Expectancy theory posits that positive expectancies increase the likelihood of behavior and negative expectancies decrease the likelihood of behavior (Jones et al. 2001). Expectancies are considered a more conscious, planned type of information processing compared to other types of behavioral attitudes that are more unconscious and affective in nature (Gerrard et al. 2008). Expectancies are initially formed through social influence and observational learning, before an individual personally engages in any gambling behavior. The individual's gambling expectancies can change through personal experience, social influence, and observational learning. These dynamic expectancies influence the individual's expected outcomes of future gambling behavior, thereby decreasing or increasing one's likelihood to engage in gambling behavior.

Expectancies have been conceptually organized at two levels of specificity (i.e., general expectancies and more specific types of expectancies) (Gillespie et al. 2007a; Wong and Tsang 2012), but previous studies have focused specifically on either the general level or the specific level of expectancies. Studies on general positive expectancies in Australia (Raylu and Oei 2004a), Canada (Emond and Marmurek 2010), and Hong Kong (Tang and Wu 2012) found that individuals who were more engaged in gambling behavior (i.e., gamblers compared to non-gamblers and problem gamblers compared to non-problem gamblers) had increased expectations of positive gambling outcomes. Tang and Oei (2011) examined whether positive cognitive bias (with expectancies as one facet of cognitive bias) and other cognitive factors mediated the relationship between stress and problem gambling in separate samples of White Australian and native Chinese gamblers. They found that

cognitive bias was not related to problem gambling for either ethnic group after accounting for refusal efficacy, negative affect, life satisfaction, and perceived stress.

Studies have also been conducted on specific types of expectancies (e.g., mood enhancement, mood regulation, self-evaluation, impairment and over-involvement, social outcomes, and financial outcome expectancies) as risk and protective factors of gambling behavior (Gillespie et al. 2007b; Wickwire et al. 2010; Wong and Tsang 2012). Specific types of positive expectancies (e.g., mood enhancement) were risk factors for increased frequency of gambling and problem gambling, and specific types of negative expectancies (e.g., impairment, negative social outcomes, financial loss) were protective factors for adolescents in Canada (Gillespie et al. 2007b), United States (Wickwire et al. 2010), and Hong Kong (Wong and Tsang 2012). Low to moderate correlations between specific expectancies were observed. The pattern of results in gambling expectancy research was consistent with research on drinking expectancies (Jones et al. 2001). In an analog study of probabilistic risk decisions, Shead et al. (2008) found that individuals who expected that gambling would augment their positive mood made riskier choices than those who expected gambling behavior to alleviate their negative mood. However, no studies have examined whether specific expectancies explained ethnic differences in gambling behavior.

Research on either general or specific types of expectancies in different ethnocultural groups found consistent group differences in expectancies among non-gamblers, recreational/social gamblers, and problem gamblers (Emond and Marmurek 2010; Gillespie et al. 2007b; Raylu and Oei 2004a; Tang and Wu 2012; Wickwire et al. 2010; Wong and Tsang 2012). As individuals increased their engagement in gambling behavior, positive expectancies increased and negative expectancies decreased. However, previous studies examined gambling expectancies of different ethnic groups in isolation of one another. It is unclear whether general or specific types of gambling expectancies could explain ethnic variations in rates of initiation or problem gambling.

Cognitive Factors for Initiation and Problems Among Asian Americans and White Americans

Cognitive factors related to gambling behavior among ethnic Asians have been primarily examined with individuals of East Asian descent outside of North America (e.g., Lee et al. 2007; Loo et al. 2008; Tang and Oei 2011). Even though there were descriptive studies on gambling behavior and demographic factors related gambling for ethnic Asians in North America (e.g., Lai 2006; Petry et al. 2003), it does not appear that any studies have examined cognitive factors of gambling specifically with ethnic Asians in the United States or Canada.

Cognitive tendencies related to family and culture may influence gambling-related cognitions and behavior among Asian Americans. Asian Americans tend to have a more collectivistic and interdependent social orientation than White Americans (Markus and Kitayama 1991; Nisbett 2003), which is related to increased openness to social influence. Family serves as an agent in the cultural transmission of gambling attitudes and behaviors (Oei and Raylu 2004). Attitudes, values, and behaviors traditionally associated with Asian cultures were transmitted and retained across multiple generations of Asian Americans (Kim et al. 1999; Kim and Omizo 2010). For Asian Americans, gambling-related cognitions may include the functional value of gambling (Jessor 1987, 1991; Raylu and Oei 2004b). Oei and Raylu (2004) found that among families of different ethnic backgrounds, cognitions about gambling were transmitted from parent to child, and child cognitions in

turn influenced child gambling behavior. For many Asian groups, gambling is viewed as an acceptable means of entertainment in the context of socializing among family, friends, and acquaintances, but less acceptable outside social interactive contexts (Loo et al. 2008; Scull and Woolcock 2005). Gambling serves a major social function in many Asian cultures, so the social function of gambling is likely transmitted down through generations of Asian American families. Asian Americans also have increased exposure to other Asian Americans who endorsed positive social aspects of gambling and modeled appropriate gambling behavior in social contexts (Raylu and Oei 2004b). However, beliefs about the positive social function of gambling are balanced against the reputation for problem gambling among Asian Americans (Fong et al. 2010; Jang et al. 1998). Cognitive tendencies related to family and cultural influences may contribute to gambling-related cognitions and behaviors among Asian Americans, but the positive social aspects may be particularly important to initiation and normative, non-problematic gambling.

There may be ethnic differences between Asian Americans and White Americans in the function of gambling behavior. Gambling for fun and enjoyment was reported twice more often than social reasons as the primary reason for gambling among a White-majority sample of American college students (Neighbors et al. 2002). Mood enhancement may be a more important function of normative gambling for White Americans than Asian Americans. Cognitive factors related to mood enhancement and social aspects of gambling are likely common determinants of gambling initiation for both Asian Americans and White Americans, but it is possible that positive social factors have a stronger effect on Asian Americans than White Americans even though positive social factors are generally related to increased gambling behavior. Direct comparative studies are necessary to determine whether the effect of a factor that appears to be common to both groups on gambling initiation has a greater effect for one group than another.

The possibility that common factors can have a greater influence on certain ethnic groups can also occur with factors related to problem gambling. Cognitive biases (e.g., illusion of control and gambler's fallacy) and positive evaluations of gambling have been identified in many ethnic groups as cognitive risk factors of problem gambling (Johansson et al. 2009; Loo et al. 2008; Tang and Oei 2011). Cognitive risk factors for problem gambling are likely to be common across Asian Americans and White Americans, but it is unclear whether these risk factors place members of an ethnic group at greater risk than members of another ethnic group. It is also unclear to what extent certain cognitive factors protect both Asian Americans and White Americans against problem gambling because previous research focused on risk factors (Dickson et al. 2008). Similar to risk factors, certain protective factors may have a greater protective effect for one ethnic group than another.

Ethnic variations in the pattern of effects from cognitive factors such as positive and negative expectancies can exist in two ways. Depending on the ethnic group, there may be different risk and/or protective factors (e.g., positive social expectancies for Asian Americans and mood enhancement expectancies for White Americans). On the other hand, it is possible that there is a risk or protective factor common to both groups, but the effect of that factor may be greater for one group relative to the other (e.g., positive social expectancies place Asian Americans at greater risk, even though they also place White Americans at risk). A different pattern of factors as well as differential impact in common factors can emerge between groups. Furthermore, these ethnic variations can exist with different levels of gambling behavior (i.e., initiation vs. problem gambling). For example, ethnic variations may be observed in the factors for initiation but not for problem gambling. Expecting positive social outcomes may be related to initiation for both Asian

American and White American students, but the relationship between positive social expectancies and initiation could be stronger for Asian American students. On the other hand, positive social expectancies may be related to problem gambling for both groups, but the effect of this factor might be similar at this level of behavior. Direct comparisons at different levels of gambling behavior are necessary to determine the full extent of ethnic variations in the risk and protective effects of gambling expectancies.

Current Study

The purpose of the current study was to examine the relationships between gambling expectancies and gambling behavior in a sample of Asian American and White American college students. These relationships were examined at two levels of lifetime gambling behavior, namely whether an individual has initiated in gambling, and the extent that those who initiated gambling have experienced problems related to their gambling behavior. These distinct levels of gambling behavior were termed initiation and problem gambling, respectively. The study examined the relationship among ethnicity, expectancies, and gambling behavior while accounting for gender differences. Gender was included as a covariate because previous research found that males were at greater risk for problem gambling (Johansson et al. 2009). The first hypothesis was that Asian American students reported more problem gambling than their White American counterparts. The study tested whether certain types of expectancies mediated or accounted for ethnic differences in either initiation or problem gambling if such group differences were observed. The pattern of relationships between expectancies and gambling (initiation and problems) was then examined within each of these two ethnic groups. In line with expectancy theory and research showing differences in expectancies among non-gamblers, recreational gamblers, and problem gamblers (Emond and Marmurek 2010; Gillespie et al. 2007b; Raylu and Oei 2004a; Tang and Wu 2012; Wickwire et al. 2010; Wong and Tsang 2012), it was hypothesized that (a) positive types of expectancies were risk factors for initiation in gambling, (b) negative types of expectancies were protective factors for initiation, (c) positive expectancies were risk factors for the extent of problem gambling, and (d) negative expectancies were protective factors for the extent of problem gambling. Exploratory tests for ethnic differences in the risk or protective effects of expectancies were conducted for certain risk or protective factors of initiation or problem gambling that emerged in both groups. Potential differences in risk and protective factors for initiation and problem gambling offered implications for primary prevention and harm reduction programs, respectively. Ethnic variations in risk and protective factors could inform service providers about how to tailor such programs for individuals from different ethnic backgrounds, which can help reduce ethnic disparities and overall rates of problem gambling.

Method

Respondents

Respondents were 813 college students recruited from the psychology subject pool at a large university on the United States West Coast during the 2009 and 2010 calendar years. The respondents ranged from 18 to 25 years of age, with a mean age of 19.5 years ($SD = 2.21$). Of the total sample, 456 (56.1 %) identified themselves as Asian Americans

and 357 (43.9 %) as non-Hispanic White Americans. Consistent with the major racial/ethnic categories used by the United States Census Bureau (2012) and usage in Asian American psychology (Leong et al. 2006), Asian Americans were individuals with ethnic origins in the Far East, Southeast Asia, or the Indian subcontinent residing in the United States. Although heterogeneity existed within Asian Americans and White Americans in gambling behavior, data was aggregated within these two general ethnic categories because the specific ethnic group sizes were too small to examine meaningful differences. Of the Asian Americans students who reported their specific ethnic background, 158 (34.7 %) were Chinese, 76 (16.7 %) were Vietnamese, 42 (9.21 %) were Korean, 42 (9.21 %) were Filipino, 37 (8.11 %) were Indian, 20 (4.39 %) were Hmong, and 12 (2.63 %) were Japanese. The other 69 (15.1 %) Asian American students identified themselves as mixed Asian ethnic descent (e.g., Chinese-Vietnamese) or as members of other smaller Southeast Asian ethnic groups (e.g., Laotian, Thai). Within each ethnic group, 283 (62.3 %) of the Asian American students and 328 (91.9 %) of the White American students were born in the United States. Data was aggregated across immigrant and non-immigrant students for this ethnic comparative study because research suggests that many traditional Asian values and behaviors were retained even several generations after a family's immigration to the US (Kim et al. 1999; Kim and Omizo 2010). There were 402 (49.4 %) male respondents. Within each ethnic group, 226 (49.6 %) of the Asian Americans and 176 (49.3 %) of the White Americans were male.

Measures

Gambling behavior, personal gambling expectancies, and two demographic factors (ethnicity and gender) were examined this study.

Initiation in Gambling

Lifetime initiation in gambling was assessed using a single question with a dichotomous response. Respondents were asked "Have you ever gambled for money? By gambling, we mean to play a game of chance or skill for money." Those who responded "yes" to this question were considered to have initiated some form of gambling. Although initiation is generally defined as the onset of gambling behavior (Burge et al. 2004; DiClemente et al. 2000; Hurt et al. 2008), gambling for money was specified. Those who have gambled for money have been exposed to possible monetary losses. Monetary losses represent a major aspect of problem gambling (Welte et al. 2004). Clearly, students who had never gambled were not at risk for developing gambling problems. As such, only respondents who had initiated gambling were examined for problem gambling.

Problem Gambling

The extent of lifetime problem gambling was assessed with the 12-item South Oaks Gambling Screen-Revised for Adolescents (SOGS-RA; Winters et al. 1993). The SOGS-RA has been used extensively in gambling research on adolescents and young adults. Respondents who have initiated gambling answered yes or no to 11 dichotomous items about whether they have ever experienced symptoms of problem gambling (e.g., gambling more than intended, had arguments with friends or family related to gambling, school or work absences), and one item on a four-point Likert scale about chasing their losses. The

SOGS-RA was sum-scored to measure the number of problem gambling symptoms that respondents have experienced in the specified lifetime frame. Each “yes” response to a dichotomous item was scored as endorsing one symptom, and responding “most of the time” or “every time” to the item about chasing losses was scored as endorsing a symptom. The criterion for problem gambling was to have endorsed two or more symptoms. The reliability and validity of the SOGS-RA has been demonstrated with samples of various Asian ethnicities from different countries in Asia and North America (Arthur et al. 2008; Lesieur et al. 1991; Wong et al. 2012) and primarily White samples in North America (Poulin 2002). For the 416 students who have initiated gambling, coefficients alpha and omega (Revelle and Zinbarg 2009) were .67 and .68, respectively.

Personal Gambling Expectancies

The likelihood of 63 positive and negative outcomes of gambling behavior was assessed to develop a measurement model of personal gambling expectancies. These outcomes were based on previous studies on specific motives and expectancies related to gambling, alcohol, smoking, and substance use (Cooper et al. 1992; Halpern-Felsher et al. 2004; Lee et al. 2007; Newcomb et al. 1988). The assessment was modeled after Halpern-Felsher et al. (2004), in which respondents were asked to report the likelihood that both future positive and negative outcomes of their hypothesized smoking would occur specifically to themselves on a 0–100 point scale. The important aspects of the assessment strategy were to have respondents (a) imagine their future engagement in the behavior even if they have not initiated in the behavior, (b) consider both positive and negative outcomes of behavior, and (c) report the likelihood of the outcomes occurring directly to the respondent. To assess the perceived likelihood of both positive and negative outcomes of the respondent’s own hypothesized gambling behavior, respondents were asked to “Imagine that you are in situations that involve gambling for money, even if you have never gambled before. How likely will the following happen to you?” The item stem was “How likely is it that gambling will...,” followed by wording to emphasize personal outcomes of the respondent’s gambling (e.g., help *you* reduce tension). The response scale ranged from 0 to 100, with 0 labeled as extremely unlikely, 50 as equally likely and unlikely, and 100 as extremely likely. The procedures for selecting items for the measurement model were reported in the study results.

Procedure

The respondents first selected this study from a list of open studies on the psychology subject pool website. Then, respondents scheduled an appointment and came into a computer lab to complete an online survey. These respondents were given research participation credit upon informed consent. The survey was conducted in English and took an average of 64 min ($SD = 16.5$) to complete.

Data Analysis

A measurement model of personal gambling expectancies was developed in the first part of the analysis. After establishing internal validity and factorial invariance (Widaman and Reise 1997) through a series of confirmatory factor analyses, mean differences in expectancies were examined between those initiated and uninitiated in gambling, Asian

Americans and White Americans, and males and females. After examining group differences in the rates of initiation and problem gambling, the relationship between expectancies and gambling behavior of Asian American and White American students was examined in the second part of the analysis. Potential mediators of ethnic differences in gambling initiation and problems were examined. Finally, multiple-group structural models were used to examine ethnic variations in risk and protective factors of initiation using logistic regression, and problem gambling using count regression (Coxe et al. 2009) with the students who have initiated in gambling. The described analyses were conducted in Mplus 6.12 (Muthén and Muthén 2011) using maximum likelihood with robust standard errors to reduce estimation bias from non-normal and missing data (Yuan et al. 2004).

Results

Measurement Model of Personal Gambling Expectancies

The measurement model was developed from items related to six specific types of expectancies identified in previous research across addictive behaviors: three types of positive expectancies (mood enhancement, stress release, and social affiliation) and three types of negative expectancies (over-involvement, personal distress, and negative functioning). Nine to 11 items from each type of expectancy composed an initial pool of 63 items. From these 63 items,¹ a subset of items was selected for further examination. The subset of items was selected upon a set of statistical criteria related to normality, which was associated with improved model fit in structural equation modeling (West et al. 1995; Yuan et al. 2004). The selected items (a) followed a relatively normal distribution (i.e., lower absolute skewness and kurtosis), (b) were more plausible (i.e., higher item means and thus decreasing floor effects), and (c) had more individual variation (i.e., larger standard deviations). Four to five items were selected within each type of expectancy, composing a subset of 26 items. Seven items were further discarded due to conceptual overlap within the same type of expectancy.

A final set of 19 items was selected for a series of confirmatory factor analyses for the six hypothesized first-order factors. The mood enhancement factor was related to enjoying the fun, thrills, and unpredictability of gambling. Stress release referred to reducing bad mood, relieving tension, and mental distraction from stressful events. Social affiliation was related to gambling as a means of socializing, bonding with friends, and enjoying social gatherings. The over-involvement factor represented concerns about being unable to stop gambling within a session, unable to stop over a prolonged period of time, and becoming addicted. Personal distress was related to expecting increased feelings of anger, sadness, and anxiety as a result of gambling. Negative functioning was related to expecting problems in legal, family, and academic domains.

Second-order and bifactor structures were considered for the measurement models (Chen et al. 2005, 2006; Yung et al. 1999) after observing high correlations between the three positive types of expectancies ($\psi = .710$ to $.803$) and the three negative types of expectancies ($\psi = .608$ to $.799$) in the first-order model. Scaled loglikelihood difference tests (Satorra and Bentler 2010) were used to aid model selection between factor models with adequate fit (Marsh et al. 2004). Model fit did not significantly differ between the bifactor and first-order models, $T^*_d(5) = 5.74$, $p = .33$. The second-order model had

¹ Descriptive statistics for the initial pool of 63 items may be obtained from the first author.

worse fit than both the bifactor model, $T^*_d(13) = 61.36$, $p < .001$, and the first-order model, $T^*_d(8) = 116.98$, $p < .001$, indicating that the bifactor or the first-order factor model should be selected. Even though the first-order model was more parsimonious, it was not selected because of potential issues with multicollinearity (indicated by large factor correlations) in the planned analysis of risk and protective factors. The model with two bifactor structures was selected because of its conceptual appeal. The bifactor model best represented the organization of expectancies at two levels of specificity (i.e., a general construct with more specific, underlying constructs) (Gillespie et al. 2007a; Wong and Tsang 2012). Specific expectancies could have unique effects above and beyond the effects of the general positive and the general negative expectancies on gambling initiation and problems. The standardized factor loadings for the bifactor measurement model of positive and negative expectancies and item descriptive statistics were reported in Table 1.

Table 1 Standardized factor loadings for bifactor measurement model of personal gambling expectancies with descriptive statistics

Factors and items	General factor loading	Specific factor loading	Item <i>M</i>	Item <i>SD</i>
Positive—Mood enhancement				
Be enjoyable because you won't know what to expect	0.534	0.538	31.33	28.45
Give you a pleasurable experience	0.607	0.588	33.95	26.99
Give you a thrilling experience	0.682	0.285	36.43	29.92
A way for you to have fun	0.701	0.383	36.55	28.94
Positive—Stress release				
Help you reduce tension	0.692	0.482	14.32	21.05
Help you lessen a bad mood	0.727	0.416	18.09	22.62
Help you forget about things that are usually stressful	0.685	0.260	19.04	25.61
Positive—Social affiliation				
Be a way for you to be sociable	0.777	0.312	27.11	27.63
Be a way for you to bond with friends	0.658	0.412	27.36	28.13
Make social gatherings more enjoyable for you	0.781	0.166	21.49	25.84
Negative—Over-involvement				
Be difficult to stop once you started a session	0.712	0.362	25.87	31.82
Be difficult for you to stop for good	0.671	0.567	16.07	27.80
Result in you becoming addicted	0.754	0.417	18.63	28.78
Negative—Personal distress				
Make you feel angry	0.532	0.470	36.17	30.27
Make you feel sad	0.621	0.517	26.63	29.35
Make you feel anxious	0.512	0.494	35.05	32.91
Negative—Negative functioning				
Get you in trouble with the law	0.583	0.254	24.46	26.44
Get you in trouble with your family	0.751	0.349	30.56	35.96
Impair your academic performance	0.741	0.204	23.25	32.06

General positive and negative expectancies correlated at 0.335. Model fit: MLR $\chi^2 = 616.67$, $df = 132$, RMSEA = 0.058 [0.053, 0.064], CFI = .941, TLI = 0.923, SRMR = 0.070. All factor loadings significant at the .05 level

To ensure that measurement bias across respondent categories did not influence the results for ethnic differences in gambling expectancies and the relationship between expectancies and gambling behavior, factorial invariance (Widaman and Reise 1997) was established between the following subsamples: students who had initiated gambling and those who had not, Asian Americans and White Americans, and males and females (see Table 2).

Group Differences in Personal Gambling Expectancies

Group differences were observed across respondent categories in the means and variances of the eight expectancy factors (see Table 3). Students who have initiated in gambling had higher mood enhancement expectancies, higher social affiliation expectancies, and lower general negative expectancies than those who have not initiated. Asian Americans had both higher general positive and negative expectancies than White Americans. Asian Americans also expected less personal distress and social affiliation outcomes from gambling behavior. Males had higher positive expectancies at both general and specific levels (mood enhancement, stress release, and social affiliation) than females. A general pattern of higher positive expectancies and lower negative expectancies was found among those initiated in gambling in comparison to those never initiated in gambling, and among males in comparison to females. There was an inconsistent pattern of group differences between Asian Americans and White Americans in personal gambling expectancies.

Rates of Initiation and Problem Gambling

The overall rates of initiation in gambling and problem gambling were first examined. Of the 813 respondents, 416 (51.2 %) reported that they have initiated in gambling. These students endorsed a mean of .89 ($SD = 1.27$) problem gambling symptoms. Among those who have initiated, 97 (23.3 %) these individuals met the SOGS-RA problem gambling criteria of endorsing two or more symptoms, meaning that 11.9 % of all respondents were considered problem gamblers. Ethnic differences in initiation and problem gambling were then examined. Rates of initiation were not significantly different between Asian Americans (51.8 %) and White Americans (50.3 %), $\chi^2(1, N = 813) = .18, p = .36$. It was hypothesized that Asian Americans would report more problem gambling than White Americans. Ethnic differences in problem gambling amongst those initiated in gambling were examined in two ways: the number of problem gambling symptoms endorsed and the percentage of respondents meeting the criteria for problem gambling. Asian Americans (mean = 1.09, $SD = 1.33$) reported significantly more problem gambling symptoms than White Americans (mean = .64, $SD = 1.13$), $t(411) = 3.68, p = .022$. Asian Americans were more likely to endorse four of the twelve specific symptoms of problem gambling (see Table 4). Asian Americans were more likely than White Americans to claim wins when they have lost, have gambled more than intended, have felt bad about gambling, and hide their gambling behavior. The rates of problem gambling among students who have initiated (two or more symptoms endorsed according to SOGS-RA criteria) was higher among Asian Americans students (28.9 %) than among White Americans (16.8 %), $\chi^2(1, N = 416) = 8.45, p = .004$. Gender differences were observed. Males reported significantly higher rates of initiation than females (67.1 vs. 35.2 %), $\chi^2(1, N = 813) = 82.3, p < .001$, experienced more problem gambling symptoms (male mean = 1.04, $SD = 1.38$ vs. female mean = .63, $SD = .96$), $t(411) = 3.19, p = .002$, and were more likely have met the problem gambling criteria (26.8 vs. 17.4 %), $\chi^2(1, N = 416) = 4.62, p = .020$.

Table 2 Model fit indices for tests of factorial invariance

Models	MLR χ^2	df	Loglikelihood	Parameters	RMSEA [90 % CI]	CFI	TLI	SRMR
Initiated versus uninitiated								
Configural invariance	716	264	-69,066	154	0.054 [0.048, 0.060]	0.947	0.931	0.061
Weak invariance	778	294	-69,097*	124	0.053 [0.047, 0.059]	0.943	0.934	0.067
Strong invariance	811	305	-69,113***	113	0.054 [0.048, 0.059]	0.940	0.933	0.067
Strict invariance	888	324	-69,152***	94	0.054 [0.049, 0.059]	0.935	0.931	0.071
Asian versus White Americans								
Configural invariance	826	264	-69,178	154	0.063 [0.057, 0.069]	0.932	0.912	0.072
Weak invariance	859	294	-69,164	124	0.059 [0.053, 0.065]	0.934	0.923	0.073
Strong invariance	879	305	-69,174	113	0.059 [0.053, 0.064]	0.932	0.924	0.074
Strict invariance	1,015	324	-69,242***	94	0.063 [0.057, 0.068]	0.918	0.913	0.078
Males versus females								
Configural invariance	773	264	-69,224	154	0.059 [0.053, 0.065]	0.939	0.921	0.072
Weak invariance	834	294	-69,255*	124	0.057 [0.051, 0.063]	0.937	0.926	0.077
Strong invariance	845	305	-69,260	113	0.056 [0.050, 0.061]	0.937	0.929	0.077
Strict invariance	902	324	-69,289*	94	0.055 [0.050, 0.060]	0.935	0.931	0.078

* $p < .05$; ** $p < .01$; *** $p < .001$ in scaled loglikelihood difference test of model fit T^*_d against preceding, less restricted model

Table 3 Group differences in expectancy factor scores

Factors	Initiated versus uninitiated		Asian versus White Americans		Males versus females	
	Mean	Variance	Mean	Variance	Mean	Variance
General positive	0.03	1.09***	0.26*	1.31***	0.33**	1.21***
Positive—Mood enhancement	1.22***	1.55***	-0.38**	.96***	0.31*	1.01***
Positive—Stress release	0.45	1.42**	0.28	1.87**	0.38*	2.03**
Positive—Social affiliation	1.00**	1.72*	-0.46**	0.57	0.42*	1.46*
General negative	-0.57***	0.57***	0.76**	1.57***	-0.41	0.88***
Negative—Over-involvement	0.25	0.49**	-0.29	2.43**	0.60	0.75**
Negative—Personal distress	0.08	0.65**	-0.74***	0.53***	0.49	0.95***
Negative—Negative functioning	-0.28	2.61	-0.21	1.03	1.26	0.85

* $p < .05$; ** $p < .01$; *** $p < .001$ in tests of group difference of focus group (1st group) against standardized factors in reference group (2nd group with mean = 0, variance = 1). Results based on estimates from strong invariance models

Mediators for Ethnic Differences in Gambling

The rates of gambling initiation were similar between Asian American and White American students, but a significant ethnic difference was observed in problem gambling. Thus, exploring potential mediating effects between ethnicity and problem gambling was warranted. To increase statistical power for capturing individual differences in the extent of problem gambling, count regression (Coxe et al. 2009) was used to examine risk and protective factors of problem gambling (i.e., the number of symptoms endorsed, not whether individuals are classified as problem gamblers under the SOGS-RA criteria). Count regression was appropriate because the outcome variable (i.e., problem gambling) was a positively skewed distribution of non-negative integers with many zeros, reflecting that most students who initiated did not report any symptoms. The selection between Poisson and negative binomial (NB) regression models for problem gambling variable was first considered in two direct effects models. Problem gambling was regressed on the eight types of expectancies, ethnicity, and gender to determine which skewed distribution was more appropriate. In the NB model, the dispersion parameter estimate were significant, dispersion = .517, $p = .003$. However, model fit was not significantly different between Poisson and NB models, $T^*_d(1) = 1.27$, $p = .33$. Due to these mixed results, each potential mediator was examined with both Poisson and NB regression models.

Eight indirect effects models were specified to identify the types of expectancies that potentially mediated the ethnic difference in problem gambling. Each type of expectancy was examined sequentially while controlling for gender and the other seven types of expectancies. However, the two required conditions for the presence of mediated effects were not met. According to Preacher and Hayes (2008), the two required conditions were that (a) Asian Americans reported higher levels of a certain type of expectancy, and (b) that same type of expectancy was positively related to problem gambling. These two conditions were not met with any of the eight types of expectancies when either a Poisson or NB distribution was specified for problem gambling. The first condition was met with two of the eight types of expectancies. Asian Americans reported higher general negative expectancies, $b_p = 0.48$, $p = .001$, 95 % CI [0.19, 0.78], $b_{NB} = 0.42$, $p = .004$, 95 % CI [0.13, 0.71], and stress release expectancies, $b_p = 1.69$, $p < .001$, 95 % CI [1.34, 2.04],

Table 4 Endorsement of lifetime problem gambling symptoms among initiated and within ethnic groups

Problem gambling symptoms	Initiated	Asian Americans	White Americans
1. When you gamble how often do you go back another day to win back the money you lost?	2.2 %	2.2 %	2.2 %
2. Have you ever claimed to be winning money while gambling even though you were actually losing money?	11.6 %	15.8 %*	6.5 %
3. Has your betting money ever caused any problems for you such as arguments with family and friends or problems at school or work?	2.9 %	3.1 %	2.7 %
4. Did you ever gamble more than you intended to?	29.3 %	34.2 %*	23.2 %
5. Have people criticized your betting or told you that you had a gambling problem regardless of whether or not you thought it was true?	2.4 %	3.1 %	1.6 %
6. Have you ever felt bad about the amount of money you bet or about what happens when you bet money?	26.2 %	31.6 %**	19.5 %
7. Have you ever felt like you would like to stop betting money or gambling but you didn't think you could?	4.1 %	5.7 %	2.2 %
8. Have you ever hidden from family or friends any betting slips, IOUs, lottery tickets, money that you won, or any signs of gambling?	2.7 %	4.4 %*	0.5 %
9. Have you had money arguments with family or friends that centered on gambling?	3.1 %	3.1 %	3.2 %
10. Have you ever borrowed from someone and not paid them back as a result of your gambling?	1.5 %	2.2 %	0.5 %
11. Have you ever skipped or been absent from school or work due to betting activities?	2.2 %	3.1 %	1.1 %
12. Have you borrowed money or stolen something in order to bet or to cover gambling activities?	1.2 %	1.3 %	1.1 %
SOGS-RA problem gambling criteria (2 + symptoms endorsed)	23.3 %	28.9 %**	16.8 %
Mean symptoms endorsed (<i>SD</i>)	0.89 (1.27)	1.09* (1.33)	0.64 (1.13)

$N = 416$ students initiated in gambling, $n = 231$ Asian Americans, $n = 185$ White Americans

* $p < .05$; ** $p < .01$; *** $p < .001$ in χ^2 or t-tests of ethnic group differences

$b_{NB} = 1.25$, $p < .001$, 95 % CI [0.63, 1.86]. However, the second condition was not met with either of these two types of expectancies. Neither general negative expectancies, $IRR_P = 0.96$, $p = .886$, 95 % CI [0.52, 1.75], $IRR_{NB} = 0.82$, $p = .465$, 95 % CI [0.49, 1.38], nor stress release expectancies, $IRR_P = 1.15$, $p = .453$, 95 % CI [0.97, 1.69], $IRR_{NB} = 0.97$, $p = .506$, 95 % CI [0.69, 1.36], were significantly related to problem gambling. As such, none of the eight types of expectancies could explain the higher rate of problem gambling among Asian Americans relative to White Americans.

Risk and Protective Factors Among Asian and White Americans

Multiple-group structural equation models were used to examine the role of expectancies as risk and protective factors of gambling for Asian American and White American students (see Table 5). Factors related to initiation in gambling were first examined. The

Table 5 Results from regression models for initiation and problem gambling for Asian and White Americans

Variable	Asian Americans initiation		White Americans initiation		Asian Americans problem gambling		White Americans problem gambling	
	OR	95 % CI	OR	95 % CI	IRR	95 % CI	IRR	95 % CI
General positive	1.35***	[1.19, 1.53]	1.24*	[1.02, 1.51]	1.61**	[1.16, 2.23]	1.10	[0.55, 2.16]
Positive—Mood enhancement	1.29**	[1.12, 1.50]	1.44**	[1.11, 1.87]	1.03	[0.86, 1.23]	1.12	[0.80, 1.56]
Positive—Stress release	0.87	[0.73, 1.04]	0.99	[0.79, 1.23]	0.68***	[0.58, 0.78]	0.95	[0.61, 1.46]
Positive—Social affiliation	1.29	[0.76, 1.33]	1.44	[0.70, 2.14]	0.77**	[0.63, 0.94]	1.28	[0.63, 2.59]
General negative	0.67***	[0.56, 0.80]	0.71**	[0.58, 0.87]	0.88	[0.64, 1.23]	1.47	[0.86, 2.50]
Negative—Over-involvement	1.02	[0.80, 1.31]	1.07	[0.85, 1.35]	1.30	[0.89, 1.91]	2.65***	[1.76, 4.01]
Negative—Personal distress	0.98	[0.81, 1.18]	0.82*	[0.68, 0.99]	1.08	[0.84, 1.40]	1.27	[0.72, 2.24]
Negative—Neg. functioning	1.02	[0.79, 1.32]	0.59**	[0.39, 0.88]	0.90	[0.70, 1.16]	0.66*	[0.46, 0.94]
Gender (male = 1)	1.37***	[1.21, 1.53]	1.27	[0.98, 1.65]	1.31	[0.83, 2.07]	1.39	[0.66, 2.91]
Intercept					0.77	[0.52, 1.13]	0.30***	[0.17, 0.52]

N = 813 for initiation, *N* = 416 for problem gambling. All gambling expectancies were specified as standardized latent variables. No significant difference in effect size was observed in factors that were significant for both groups

OR odds ratio for initiation, IRR incidence rate ratio of PG symptoms with Poisson regression (e^b), CI confidence interval

* $p < .05$; ** $p < .01$; *** $p < .001$

bifactor measurement model of expectancies (general positive, general negative, mood enhancement, stress release, social affiliation, over-involvement, personal distress, and negative functioning) with gender as a covariate were specified as predictors of gambling initiation in parallel logistic regression models between Asian American and White American students.

It was hypothesized that positive types of expectancies were risk factors for initiation, and negative types of expectancies were protective factors for initiation. For Asian Americans, general positive expectancies was a risk factor for initiation, $OR = 1.35$, $p < .001$, 95 % CI [1.19, 1.53], with mood enhancement expectancies a risk factor above and beyond general positive expectancies, $OR = 1.29$, $p = .001$, 95 % CI [1.12, 1.50]. General negative expectancies was a protective factor, $OR = 0.67$, $p < .001$, 95 % CI [0.56, 0.80]. Asian American males were more likely to have gambled than females, $OR = 1.37$, $p < .001$, 95 % CI [1.21, 1.53]. The same risk factors emerged for White Americans, but additional protective and risk factors emerged. General positive expectancies was a risk factor, $OR = 1.24$, $p = .027$, 95 % CI [1.02, 1.51], with mood enhancement expectancies contributing to additional risk, $OR = 1.44$, $p = .007$, 95 % CI [1.11, 1.87]. General negative expectancies was a protective factor, $OR = 0.71$, $p = .001$, 95 % CI [0.58, 0.87]. Personal distress, $OR = 0.82$, $p = .034$, 95 % CI [0.68, 0.99], and negative functioning, $OR = .59$, $p = .009$, 95 % CI [0.39, 0.88] emerged as additional protective expectancies for White American students.

Three sets of model comparisons were then conducted to examine potential group differences in the effect of risk and protective factors that emerged in both groups. Goodness of fit was compared between nested models in which the effect size of one common factor was specified as equal versus unequal between ethnic groups. The comparisons revealed no significant difference between Asian Americans and White Americans in the impact of common risk or protective factors on initiation: general positive expectancies, $T^*_d(1) = .03$, $p = .87$, mood enhancement, $T^*_d(1) = 1.34$, $p = .25$, and general negative expectancies, $T^*_d(1) = .19$, $p = .66$.

The relationship between expectancies and problem gambling was then examined in a multiple-group count regression model. Both Poisson and negative binomial (NB) regression models were considered. In the NB model, the dispersion parameter estimates were not significant for both Asian Americans, dispersion = .31, $p = .25$, and White Americans, dispersion = .12, $p = .87$. Model fit (scaled loglikelihood NB = -49,416, Poisson = -47,230; AIC NB = 72,999, Poisson = 72,992; BIC NB = 73,447, Poisson = 73,431) was also worse for NB model, indicating that Poisson regression was sufficient to examine the extent of problem gambling within each ethnic group. It was hypothesized that positive types of expectancies were risk factors for problem gambling, and negative types of expectancies were protective factors for problem gambling. A unique pattern of relationships emerged between expectancies and problem gambling for each group. For Asian Americans who have initiated, general positive expectancies was a risk factor for problem gambling, $IRR = 1.61$, $p = .038$, 95 % CI [1.16, 2.23]. However, stress release expectancies, $IRR = 0.68$, $p = .038$, 95 % CI [0.58, 0.78], and social affiliation expectancies, $IRR = 0.77$, $p = .038$, 95 % CI [0.63, 0.94] were related to decreased problem gambling. For White American students who have initiated, over-involvement expectancies was related to increased problem gambling, $IRR = 2.65$, $p = .038$, 95 % CI [1.76, 4.01], whereas negative functioning expectancies was a protective factor, $IRR = 0.66$, $p = .038$, 95 % CI [0.46, 0.94]. No risk or protective factors of problem gambling were common to both ethnic groups.

In summary, multiple group models were applied to determine the extent that risk and protective factors of initiation were common and specific between Asian American and White American students. The extent of common and specific risk and protective factors of problem gambling between ethnic groups was also examined with multiple group models with students who have initiated in gambling. General positive expectancies, general negative expectancies, and mood enhancement were significant risk factors for initiation in both groups. The impact of these common risk factors between groups was not significantly different. Male gender emerged as a specific risk factor for initiation for Asian Americans while personal distress and negative functioning were specific protective factors for White Americans. With respect to problem gambling, general positive expectancies was a risk factor for Asian Americans, but specific expectations of gambling as a means to release stress and positive social outcomes were protective factors. For White Americans, over-involvement was a risk factor of problem gambling while negative functioning was a protective factor. No common risk or protective factors of problem gambling were observed between the two ethnic groups.

Discussion

This was the first comparative study examining ethnic variations in personal gambling expectancies as risk and protective factors for both initiation and problem gambling among Asian American and White American college students. Personal gambling expectancies were represented at two levels of specificity using a bifactor model. The influence of general positive expectancies, general negative expectancies, and six specific types of expectancies above and beyond the effects of general expectancies was examined. The bifactor model yielded more information about general and specific expectancies, which allowed for a more nuanced study of the relationship between expectancies and gambling behavior. This study also examined the rates of initiation and problem gambling among these students. There was further evidence for ethnic disparities in problem gambling: Asian Americans initiated at similar rates to White Americans but had higher rates of problem gambling (Welte et al. 2004, 2011; Wong et al. 2012).

One of the goals of this study was to determine whether personal gambling expectancies could explain ethnic disparities between Asian American and White American students in gambling. No ethnic difference was observed in initiation of gambling behavior, so it was not necessary to identify mediators between ethnicity and initiation. Consistent with the hypothesis of ethnic disparities in problem gambling based on empirical and anecdotal evidence (Fong et al. 2010; Jang et al. 1998; Welte et al. 2004, 2011; Wong et al. 2012), Asian American students reported more problem gambling. Asian American students had higher general negative and stress release expectancies than White American students, but these expectancies were not functionally related to problem gambling.

Expectancies may not have mediated the relationship between ethnicity and problem gambling because other variables may better explain this relationship. Expectancies are part of a planned, rational behavior process that is under cognitive control (Gerrard et al. 2008), but a major aspect of problem gambling is that it involves gambling behavior that is increasingly out of cognitive control. Research on adolescent problem gambling has identified three primary subtypes of problem gamblers: behaviorally-conditioned, emotionally vulnerable, and biologically vulnerable problem gamblers (Blaszczynski and Nower 2002; Gupta et al. 2012). For problem gamblers who have been conditioned to continue their gambling for enjoyment or use gambling to cope with their emotional

problems, problem gambling is indeed related to more affective, automated, and habitual behavior processes that underlie many addictions (Everitt and Robbins 2005; Shaffer et al. 2004; Tiffany 1990). Other factors that might be more salient among Asian Americans (e.g., acculturation, norms, attitudes, and financial expectancies) (Gillespie et al. 2007a; Loo et al. 2008) were not examined in this study. It is possible that other types of cognitions related to mood (e.g., coping with more intense negative states) or unplanned gambling behavior can explain group differences in problem gambling. It is also possible that there was insufficient statistical power to capture mediated effects because the tests involved multiple latent variables (i.e., two general and six specific expectancies) with a nonnormal outcome variable (i.e., problem gambling in a count distribution) (Fritz and MacKinnon 2007).

Another goal of this study was to determine whether the pattern of risk and protective factors of initiation and problem gambling varied between Asian American and White American college students. Possible group differences in risk and protective effects for factors that emerged in both ethnic groups were also examined. Based on expectancy theory (Jones et al. 2001) and previous research on gambling expectancies, it was first hypothesized that positive types of expectancies would be risk factors for initiation, and negative types of expectancies would be protective factors. The overall pattern of results between expectancies and initiation supported much of the previous findings on general expectancies (Emond and Marmurek 2010; Raylu and Oei 2004a; Tang and Wu 2012) and specific types of gambling expectancies (Gillespie et al. 2007b; Wickwire et al. 2010; Wong and Tsang 2012). It appears that general positive expectancies rather than specific expectations drive the initial interest in gambling. One reason is that in the initial stages of engagement, people may not be that knowledgeable about specific outcomes of personal gambling. Therefore, a general positive attitude towards gambling drives initiation (Shaffer et al. 2004). It is also possible to develop a generally negative attitude towards gambling without knowledge about specific outcomes. Thus, a general negative attitude drives individuals away from gambling. The additional risk of initiation due to mood enhancement expectancies may be related to dispositional styles such as sensation seeking. This tendency to seek out highly arousing and novel activities influences initiation in gambling (Coventry and Brown 1993) and many other addictive behaviors (Roberti 2004).

It was further hypothesized that positive types of expectancies would be risk factors for problem gambling, and negative types of expectancies would be protective factors. Considering the pattern of risk and protective factors within each group, it appears that expectancy theory better explained problem gambling risks in Asian American students than White American students. The positive relationship between general positive expectancies and problem gambling in Asian Americans was consistent with the hypothesis and previous research (Emond and Marmurek 2010; Raylu and Oei 2004a; Tang and Wu 2012). Contrary to the hypothesis, it appears that Asian American students who gamble with more additional expectations of socializing and stress release were at somewhat lower risk. This finding may be explained by considering the function of gambling behavior as a normative form of entertainment in social settings for many Asian groups (Loo et al. 2008; Raylu and Oei 2004b; Scull and Woolcock 2005). Even though general positive expectancies contributed to the increased potential for developing problems, Asian American students who gamble for more social and stress release outcomes may be more likely to maintain a more controlled or more recreational pattern of gambling that does not become problematic. The strong positive relationship between expectations of over-involvement and problem gambling in White American students was inconsistent with the hypothesis of negative types of expectancies as a protective factor. The hypothesis were based on the

assumption that those who expect to lose control of their gambling behavior and gamble excessively (should they further engage in gambling behavior) were less likely to gamble. Instead, this finding could reflect the view of those who have already experienced a lapse in control of their gambling behavior. Their perceived loss of control could be upsetting and interpreted as a sign of addiction (Marlatt and George 1984). Lower perceived behavioral control was related to problem gambling (Martin et al. 2010). The recognition of negative functioning as a protective factor was consistent with the hypothesis. The view that gambling is harmful due to adverse effects on functioning may curtail the extent of gambling so it does not become a problem for White American students.

The impact of general positive expectancies on initiation was similar between Asian American and White American students, suggesting that primary prevention efforts focused on decreasing the perceived benefits of gambling should be effective for both ethnic groups. There was evidence to support the effectiveness of programs that address misconceptions and increase knowledge about gambling behavior in adolescents (Ladouceur et al. 2004). Prevention programs that challenged myths and positive expectancies of alcohol and drug use have received empirical support (D'Amico and Fromme 2000). General expectations of positive outcomes should be discussed in primary prevention programs, but a major point to address is the perceived fun and thrills of gambling. Similar to drinking prevention programs that discussed alternate rewarding behaviors (Kivlahan et al. 1990), healthy recreational activities (e.g., intramural sports, outdoor adventure programs) should be encouraged as alternatives to gambling. Primary prevention for both groups should involve efforts to increase students' general negative expectancies of gambling behavior. However, the additional protective factors (expecting personal over-involvement and negative functioning) that emerged for White American students suggest that they may be more responsive to information about potential risks than Asian American students.

With respect to problem gambling, the findings indicated different risk as well as different protective factors for young Asian Americans and White Americans who have initiated in gambling. The findings have important implications for culturally tailoring interventions designed to address addictive behaviors among young adults, such as harm reduction programs to reduce negative consequences associated with gambling (Dickson et al. 2004). For young White Americans, it appears that such programs should focus more on strategies to regain or enhance control over one's gambling behavior to counter feelings and the perception that one has progressed to an addictive state. To counter the distress caused by views that any further gambling is equivalent to addiction, aspects of relapse prevention training techniques may be employed. Increasing client self-efficacy in controlling their gambling can decrease distress about one's gambling, thereby reducing comorbid issues of depression and anxiety. Also, the programs can make salient the specific burden of problem gambling on personal and family resources to capitalize on the protective effect of expectancies of diminished functioning associated with problem gambling. On the other hand, harm reduction programs for young Asian Americans could be adapted to reorient them away from the general positive expectancies about gambling but rather to focus them on engaging in more controlled recreational gambling for social reasons. Limiting gambling to social interactive contexts with close others (e.g., friends and family) may be a more realistic goal than the complete abstinence of gambling. Requiring the presence of close others is beneficial because others can monitor and warn the individual about his/her gambling behavior. Since Asian American students are more likely to have a collectivistic and interdependent social orientation, they may be less likely

to deviate from acceptable levels of gambling in the presence of close others in order to avoid negative impact on their relationships (Osilla et al. 2012; Wong and Tsang 2012).

There were several limitations in the current study. This was a correlational study, so causal attributions could not be made between expectancies and gambling behavior. Social-cognitive theory (Bandura 1978, 2004) posits that the relationship between expectancies and gambling behavior is reciprocal in nature. After an individual initiates in gambling behavior, their personal outcomes and observations of other's gambling can further influence one's own expectancies. However, for some individuals who develop problem gambling, negative expectancies may have little effect on subsequent gambling behavior because an inherent aspect of problem gambling is to continue gambling despite recognition of problems. Longitudinal studies are needed to more definitively address the reciprocal relationship between expectancies and gambling. The process in which both expectancies and gambling behavior naturally change over time for both recreational and at-risk gamblers should be examined. Another limitation is that financial expectancies were not considered in this study because we focused on the types of expectancies also relevant to alcohol and substance use. Items related to financial gains and losses (e.g., Gillespie et al. 2007a) should augment the current bifactor model of personal gambling expectancies. Other types of gambling-related cognitions (e.g., social norms and affective attitudes) must also be considered in future studies to determine the extent that expectancies have a unique relationship to gambling behavior. Problem gambling may function through a more unconscious, automatic behavioral process, so implicit associations are another promising approach to study gambling-related cognitions (e.g., Brevers et al. 2012).

Despite possible heterogeneity among Asian Americans, the results were consistent with other research showing ethnic variations between Asian Americans and White Americans in problem gambling (Welte et al. 2004, 2011; Wong et al. 2012). In addition to ethnic differences in overall rates and extent problem gambling, there were ethnic differences in the endorsement of specific problem gambling symptoms. Two of the four symptoms that Asian Americans were more likely to endorse (claiming wins, hiding bets) were related to minimizing other's concerns about one's own gambling. Future studies specifically on Asian Americans should investigate the relationship between positive and negative social aspects of gambling behavior. These studies will need to account for potential heterogeneity in the extent Asian Americans are influenced by both mainstream and ethnic cultures by assessing their levels of acculturation and enculturation (Miller 2010).

This study provide a nuanced examination of ethnic variations in gambling by testing for ethnic differences in gambling and the influence of gambling expectancies at two levels of gambling behavior, initiation of gambling and gambling problems. In this way, we could determine if these expectancies were common across ethnic groups or ethnic specific in nature and if these risk patterns varied by the two levels of gambling behavior. Given this purpose, gender was not the focus of the current study but was included as a covariate in each analysis of risk and protective factors. Gender differences were found in personal gambling expectancies, initiation, and problem gambling, in which males reported higher levels of both general and specific types of positive expectancies, were more likely to have initiated, and reported more symptoms of problem gambling. Asian American males were specifically at increased risk of initiation. Positive expectancies could potentially explain the increased risk of initiation and problem gambling among males in this and previous studies (e.g., Stoltenberg et al. 2008; Wong et al. 2012). There is a need for comprehensive studies on the relationships among ethnicity, gender, gambling-related cognitions, and gambling. These studies will need to consider gender-related attitudes that may vary by

ethnicity, such as gender role socialization and expectations (Liu and Iwamoto 2007). These studies will also need to account for dispositional styles (e.g., risk-taking/aversion, sensation seeking, and impulsivity) (Coventry and Brown 1993) that may explain gender differences in gambling (Wong et al. 2012).

Research on drinking expectancies has formed the basis of alcohol expectancy-challenge programs to decrease college drinking (Scott-Sheldon et al. 2012). Thus, programs adapted from successful alcohol expectancy-challenge programs (Dickson et al. 2002) may emerge as problem gambling receives more public attention. However, there is an urgent need to develop the empirical basis specifically for gambling interventions rather than assuming that it is sufficient to design interventions based on research on other addictive behaviors (Dickson et al. 2004; Derevensky et al. 2005). Specifically, it is critical to understand how expectancies and gambling behavior affect one another over time, and whether this expectancy-behavior relationship differs between students of different ethnic backgrounds. This knowledge is necessary to develop culturally-sensitive and effective gambling prevention.

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