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Risk factors for gambling and substance use among recent college students

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ABSTRACT

Background: While it is well known that substance use and gambling overlap, the degree to which this overlap can be explained by shared risk factors has not been fully explored. This study aimed to identify common and unique risk factors for gambling and substance use among young adults.
Methods: Young adults ($n = 1,019$) in a longitudinal study since college entry were interviewed annually. Past-year frequency of seven gambling activities was assessed once (Year 5). Structural equation models evaluated suspected risk factors in two models, one for gambling with substance use as an intermediary variable, and one for substance use with gambling as the intermediary variable.
Results: Sixty percent gambled; 6% gambled weekly or more. Examination of the two structural models supported the existence of significant paths (a) from two of the five substance use variables (alcohol, drugs) to gambling frequency, and (b) from gambling frequency to all five substance use variables. Every risk factor associated with gambling was also associated with one or more substance use variables. Risk factors common to gambling and substance use were sex, race/ethnicity, extracurricular involvement (fraternity/sorority, athletics), impulsive sensation-seeking, and behavioral dysregulation. Risk factors unique to substance use were conduct problems, anxiety, and parent's history of alcohol and mental health problems.
Conclusions: Gambling and substance use are interrelated, but with incomplete overlap in their respective risk factors. Results underscore the need for longitudinal research to elucidate their distinct etiologies.

1. Introduction

Gambling is a topic of public health concern among college students. Past-year prevalence estimates have ranged from 35% to 87% (Atkinson et al., 2012; Ellenbogen et al., 2008; LaBrie et al., 2003; Seifried et al., 2009; Welte et al., 2008; Wickwire et al., 2008; Wickwire et al., 2007; Winters et al., 1998), depending on how gambling behavior was measured. College students engage in a variety of different gambling activities, including playing the lottery, buying raffle tickets, playing cards for money, betting on sports, and playing sports for money (Barnes et al., 2010). While playing the lottery and card games tend to be the most prevalent among college students (Barnes et al., 2010; Wickwire et al., 2007), the popularity of certain gambling activities varies geographically based on proximity to gambling venues such as casinos and racetracks.

Among college students who do gamble, most do so infrequently. For example, LaBrie et al. (2003) found that while 25% of college students played the lottery, only 1% did so weekly or more. Some college students who gamble much more frequently might be considered problem gamblers. Studies using a standardized instrument to assess problem gambling {e.g., the South Oaks Gambling Screen [SOGS (Lesieur and Blume, 1987)]} have produced estimates ranging from 5% to 14% of college students meeting criteria for problem gambling (Bhullar et al., 2012a; Burger et al., 2006; Engwall et al., 2004; Martin et al., 2012; Weiss, 2010; Wickwire et al., 2008; Winters et al., 1998).

Several cross-sectional studies have focused on the overlap between gambling and substance use among college students and have consistently observed significant positive associations between gambling, problem gambling, and alcohol use (Bhullar et al., 2012b; Engwall et al., 2004; Goudriaan et al., 2009; Huang et al., 2011; LaBrie et al., 2003; Martens et al., 2009; Martin et al., 2014; Stuhldreher et al., 2007; Vitaro et al., 2001). For example, Bhullar et al. (2012b) found that, compared with students who did not meet criteria for binge drinking, binge drinking college students were more likely to participate in

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poker, Internet gambling, sports betting, and office pools. Similarly, Engwall et al. (2004) found that college student problem gamblers were more likely to be heavy drinkers and experience negative alcohol-related consequences compared with other students. Gambling is also significantly and positively associated with marijuana and other drug use (Engwall et al., 2004; Goudriaan et al., 2009; Huang et al., 2011; LaBrie et al., 2003; Lynch et al., 2004; Stuhldreher et al., 2007; Winters et al., 1998).

One major question is the extent to which the overlap between gambling and substance use can be explained by commonalities in pre-existing risk factors. Examples of shared risk factors for both gambling and substance use include family history, mental health problems, and gender (Barnes et al., 1999; Cook et al., 2015; Mezzich et al., 2001; Vitaro et al., 2014). A recent study utilizing adolescent twin pairs found a significant genetic influence on both gambling and substance use (Vitaro et al., 2014), which is consistent with other research among adults (Slutske et al., 2000; Slutske et al., 2013). Longitudinal data examining gender as a risk factor show an association between gambling problems and incident alcohol dependence among men (Pilver et al., 2013). Affiliation with delinquent peers or poor parental supervision are also common etiological factors to substance use and gambling among adolescents (Vitaro et al., 2001). Several studies show that temperament characteristics such as impulsivity, behavioral dysregulation, and deviance are predictive of both gambling and substance use (Barnes et al., 1999; Leeman et al., 2014; Mezzich et al., 2001; Vitaro et al., 2001).

Of the 11 studies that examine gambling and substance use among college students, only two account for shared risk factors. Winters et al. (1998) evaluated the non-redundant association between drug use and gambling to take into account several possible risk factors, the most significant of which were parental history of problematic gambling, male gender, and illicit drug use more than once per week. LaBrie et al. (2003) found that college students were more likely to gamble if they had families that did not disapprove of drinking, had parents who drank alcohol, and were involved in Greek life or athletics. Some researchers have suggested that excessive alcohol use and gambling might be part of a larger constellation of problem behaviors (Bhullar et al., 2012b; Engwall et al., 2004; Goudriaan et al., 2009; LaBrie et al., 2003; Martens et al., 2009; Stuhldreher et al., 2007; Weiss, 2010).

This study aimed to: 1) document the prevalence of gambling activities among a large sample of college-educated young adults; and 2) examine the independent relationships of several hypothesized risk factors with gambling and five measures of substance use based on two alternative structural models that account for their respective intermediary effects. We hypothesized that both direct and indirect effects would be observed, such that some risk factors would be shared by gambling and substance use simultaneously, while other risk factors would be uniquely associated with either gambling or substance use.

2. Methods

2.1. Study design

Data were gathered as part of the College Life Study, a longitudinal study of health-risk behaviors among a cohort of 1,253 young adults who were originally enrolled as first-year college students. Detailed methodological information has been published previously (Arria et al., 2008; Vincent et al., 2012). Briefly, in 2004, the incoming class of first-year students ages 17 to 19 at a large mid-Atlantic university were invited to complete a short assessment on substance use during high school (N = 3,401; 89% response rate). A sample was then recruited for the longitudinal study after oversampling students who had used an illicit drug or nonmedically used a prescription drug at least once during high school. Because virtually all members of the incoming student cohort were assessed at summer orientation, stratified random sampling was possible, as described previously (Arria et al., 2008); no

classroom clustering occurred. A two-hour baseline assessment (Year 1) was administered sometime during their first year of college (n = 1,253; 87% response rate) and included both structured interview and self-administered modules. These participants were followed up annually in similar assessments, regardless of continued college attendance, with high follow-up rates (91% in Year 2, n = 1,142; 81% in Year 5, n = 1,019). Participants received cash incentives for each assessment they completed, and informed consent was obtained. Interviewers were trained extensively in confidentiality protection procedures. IRB approval and a federal Certificate of Confidentiality were obtained.

2.2. Participants

The analytic sample was restricted to 1,019 individuals (462 men, 731 non-Hispanic white) who completed the Year 5 assessment, because this was the year in which gambling behaviors were measured. By then, 80% had already graduated from college and 38% were enrolled in graduate school or other coursework. Compared with the 234 individuals who did not complete the Year 5 assessment, the inclusion sample was over-representative of females (55% vs. 38%, $p < .001$) but similar with respect to race, mother's education, and neighborhood income during high school. Characteristics of the sample are presented in Table 1.

2.3. Measures

2.3.1. Gambling Behaviors

Participants were asked in Year 5 how often they engaged in each of seven different gambling activities during the past year: gambling on the Internet, playing cards for money with friends, going to a casino, playing the lottery, betting on sports, betting on horse or dog races, and betting on games of personal skill. Response options (not at all, less than monthly, monthly, weekly, and daily) were scored 0 through 4, and were later summed to create an overall index of gambling frequency (Cronbach's $\alpha = .67$). We did not expect to find a large number of problem gamblers among this general college student sample, therefore we opted to assess gambling frequency instead of gambling problems. Gambling frequency was thought to be a good proxy for problem gambling in the future. Items were adapted from prior surveys (Winters et al., 1993).

2.3.2. Tobacco, Alcohol, and Other Drug Use

Past-year frequency of use was assessed via a structured interview in Year 5 for alcohol, tobacco, marijuana, and nine other types of illicit drugs (inhalants, hallucinogens, cocaine, amphetamines/methamphetamine, heroin, ecstasy) and prescription drugs used nonmedically (stimulants, analgesics, and tranquilizers). The variables on alcohol, tobacco, and marijuana use frequency were used in the present analyses as self-reported. For the nine other drugs, an index of other drug use was computed as the count of drugs that were used during the past year (0 to 9).

A series of questions (Substance Abuse and Mental Health Services Administration, 2003) assessed the DSM-IV criteria for Alcohol Use Disorders [AUD (American Psychiatric Association, 1994)]. Responses were later consolidated into a six-level variable [did not drink in the past year (0), drank fewer than five times (1), drank but did not endorse any AUD criteria (2), endorsed some AUD criteria but insufficient to meet the definition of alcohol abuse or dependence (3), alcohol abuse (4), alcohol dependence (5)] as an overall indicator of risk for AUD. This variable has demonstrated construct validity in prior studies with this sample (Arria et al., 2014; Arria et al., 2013d).

2.3.3. Demographic Characteristics

Race/ethnicity and highest educational attainment of mother and father were self-reported. Sex was coded as observed at Year 1. Salary,