



## Cigarette smoking, problem-gambling severity, and health behaviors in high-school students



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### ABSTRACT

**Introduction:** Smoking and gambling are two significant public health concerns. Little is known about the association of smoking and gambling in adolescents. The current study of high-school adolescents examined: (1) smoking behavior by problem-gambling severity and (2) health-related variables by problem-gambling severity and smoking status.

**Methods:** Analyses utilized survey data from 1591 Connecticut high-school students. Adolescents were classified by problem-gambling severity (Low-Risk Gambling [LRG], At-Risk/Problem Gambling [ARPG]) and smoking status (current smoker, non-smoker). Analyses examined the smoking behavior of ARPG versus LRG adolescents as well as the smoking-by-problem-gambling-severity interactions for health and well-being measures (e.g., grades, substance use). Chi-square and logistic regression analyses were used; the latter controlled for gender, race/ethnicity, school grade, and family structure.

**Results:** More adolescents with ARPG than LRG reported regular smoking, heavy smoking, early smoking onset, no smoking quit attempts, and parental approval of smoking. ARPG and LRG adolescents who smoked were more likely to report poor grades, lifetime use of marijuana and other drugs, current heavy alcohol use, current caffeine use, depression, and aggressive behaviors and less likely to report participation in extracurricular activities. The association between not participating in extracurricular activities and smoking was statistically stronger in the LRG compared to the ARPG groups. Post-hoc analyses implicated a range of extracurricular activities including team sports, school clubs, and church activities.

**Conclusions:** Smoking was associated with poorer health-related behaviors in both ARPG and LRG groups. Interventions with adolescents may benefit from targeting both smoking and gambling.

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## 1. Introduction

Smoking and gambling are two significant public health concerns for adolescents. More than 5 million deaths of adults across the globe, and 480,000 deaths of adults in the U.S. every year are attributable to smoking (USDHHS, 2014; WHO, 2012). More than half of U.S. high-school students have tried smoking, and 15.8% report current cigarette smoking (CDC, 2012), and rates of smoking increase through adolescence (Baker, Brandon, & Chassin, 2004). The majority of adult smokers report consuming their first cigarette prior to age 18

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(Lantz, 2003; Schoenborn, Adams, & Peregoy, 2013; USDHHS, 2014). Adolescent smoking is associated with the development of heavy regular smoking (Colder et al., 2001; Ellickson, Tucker, & Klein, 2008; Stanton, Flay, Colder, & Mehta, 2004), continued smoking in young- and later-adulthood (Chassin, Presson, Rose, & Sherman, 1996; Patton, Coffey, Carlin, Sawyer, & Wakefield, 2006; Van De Ven, Greenwood, Engels, Olsson, & Patton, 2010), and other substance use and deviant or violent behavior (Audrain-McGovern et al., 2004; Ellickson, Saner, & McGuigan, 1997; Orlando, Tucker, Ellickson, & Klein, 2004; Stanton et al., 2004).

Gambling is also a serious concern among adolescents. Up to 86% of adolescents report some form of gambling, with 4–8% of adolescents reporting a serious gambling problem (Jacobs, 2000; Kristiansen & Jensen, 2014; Splevins, Mireskandari, Clayton, & Blaszczynski, 2010). Further, some data suggest that gambling behavior among adolescents has increased over time (Jacobs, 2000). Gambling in adolescents is associated with anxiety, depression, low self-esteem, poorer coping skills, difficulty in school, and suicidal ideation and attempts (Blinn-Pike, Worthy, & Jonkman, 2010; Jackson, Dowling, Thomas, Bond, & Patton, 2008; Jacobs, 2000; Langhinrichsen-Rohling, Rohde, Seeley, & Rohling, 2004; Lynch, Maciejewski, & Potenza, 2004; Ólason, Skarphedinsson, Jonsdottir, Mikaelsson, & Gretarsson, 2006; Petry & Tawfik, 2001; Splevins et al., 2010; Yip et al., 2011). Adolescent gambling is also associated with more severe medical and psychiatric problems in adulthood (Burge, Pietrzak, Molina, & Petry, 2004; Burge, Pietrzak, & Petry, 2006; Lynch et al., 2004), and adolescent problem gamblers are more likely than their non-gambling and non-problematic gambling counterparts to be involved in delinquency and crime and to report co-morbid use of alcohol and other drugs (Blinn-Pike et al., 2010; Jacobs, 2000; Petry & Tawfik, 2001; Splevins et al., 2010; Yip et al., 2011).

Little is known about the relationship between gambling and smoking in adolescents. Adults who gamble are more likely to report smoking than adults who do not gamble (Black, Shaw, McCormick, & Allen, 2013; Hayatbakhsh, Clavarino, Williams, Bor, & Najman, 2012; Lorains, Cowlishaw, & Thomas, 2011; McGrath & Barrett, 2009; Morasco et al., 2006). While fewer studies have explored the relationship between adolescent gambling and smoking, there is evidence for similar patterns in adolescents and adults, with adolescents who gamble reporting higher smoking rates (Jackson et al., 2008; Jacobs, 2000; Kong et al., 2013; Splevins et al., 2010; Yip et al., 2011). For example, a review found that youth who reported serious gambling-related problems used tobacco at twice the rate of their non-problem gambling counterparts (Jacobs, 2000). Together, data show that gambling in both adults and adolescents is associated with high rates of smoking. The association of gambling to other aspects of adolescent smoking behavior such as amount of daily smoking, age of smoking onset, and quit attempts has not yet been studied systematically in adolescents.

There is an association between problem-gambling severity and both psychiatric symptoms and substance use in adults. Current smoking in adult gamblers has been associated with greater anxiety, depression, drug and alcohol use, and treatment for psychiatric and substance-use disorders (Grant, Kim, Odlaug, & Potenza, 2008; Odlaug, Stinchfield, Golberstein, & Grant, 2013; Petry & Oncken, 2002; Potenza et al., 2004). Notably, one study of 465 U.S. adult pathological gamblers found that those who smoked were less likely to meet criteria for a mood disorder than gamblers who did not smoke (Grant et al., 2008). How smoking in adolescent gamblers might associate with health-related behaviors such as alcohol and other substance use, dysphoria/depression, aggression, and academic-related variables (e.g., grades, participation in extra-curricular activities) has not yet been systematically investigated.

### 1.1. Aims of the current study

Given the multiple adverse outcomes associated with both adolescent gambling (particularly with at-risk or problematic

gambling — ARPG) and tobacco use and the relationship between smoking and greater substance use and psychiatric concerns in adult gamblers, the aims of the current study were to examine (1) the smoking behavior and (2) differences in health measures by smoking status in a sample of 1591 Connecticut high-school students who reported different levels of problem-gambling severity. With regard to the first aim of the study, it was hypothesized that greater problem-gambling severity would be associated with more severe smoking behaviors. Specifically, we expected that adolescents who reported ARPG as compared to those reporting low-risk gambling (LRG) would be more likely to report smoking and would be more likely to report heavier daily smoking, an earlier onset of smoking, a lower number of smoking quit attempts, and more lenient perceived parental perceptions regarding smoking. With regard to the second aim of the study, it was hypothesized that across problem-gambling-severity groups, adolescents who smoke would report greater adverse measures of health and well-being compared to adolescents who do not smoke. Specifically, we expected that ARPG and LRG adolescents who smoke as compared to those who do not smoke would be less likely to report participating in extracurricular activities and would be more likely to report poor grades, current alcohol, marijuana, drug, and caffeine use, depressed mood, and aggressive behaviors. Finally, we hypothesized that there would be an interactive relationship between smoking and problem-gambling severity such that a significantly stronger relationship between smoking and poor health measures would be observed in adolescents with at-risk/problem gambling compared to adolescents with low-risk gambling.

## 2. Materials and methods

### 2.1. Participants

Participants were public high-school students in the state of Connecticut. Of the 4523 adolescents who took the survey, 2030 reported past-year gambling and completed all questions targeting DSM-IV criteria for pathological gambling. Of those adolescents, 1591 students reported that they were current or non-smokers, as defined above, and were included in the current study.

### 2.2. Measures

#### 2.2.1. Demographic and health/well-being measures

The 154-question survey assessed multiple demographics (e.g., age, gender, race/ethnicity, grade in school, family structure, current age) and health and well-being measures (e.g., extracurricular activities, grade average, use of marijuana, alcohol caffeine, other drugs, mood, aggression). Classification of these variables into groupings/categories was consistent with previous work (Potenza et al., 2011; Yip et al., 2011) and can be seen in Tables 1 and 3. With regard to academic variables, participants who endorsed that they do at least one of the following “on a regular basis” were classified as a positive endorsement of “any extracurricular activities”: community service/volunteer work, team sports, school clubs, or church activities. Grade point average was classified as “As and Bs,” “Mostly Cs,” and “Ds or lower.” Substance-use variables included lifetime use of marijuana (Yes/No), endorsement of “ever” taking a sip of alcohol (Yes/No), current use of alcohol (never a regular user of alcohol, light use, moderate use, heavy use), and lifetime use of other drugs (e.g., ecstasy, cocaine, heroin; Yes/No). Current caffeine use was classified as “none,” “1–2 caffeine drinks per day,” and “3 or more caffeine drinks per day.” With regard to mood, participants were classified as endorsing dysphoria/depression if they reported that they felt “so sad or hopeless almost every day for two weeks or more in a row that [they] stopped doing some usual activities” in the past 12 months (Yes/No). Two items assessed aggression: whether the participant got into “a physical fight in which [they] were injured and had to be treated by a doctor or

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