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## Relationships between problematic Internet use and problem-gambling severity: Findings from a high-school survey

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### Abstract

With the popularity of Internet use among adolescents, there is concern that some youth may display problematic or addictive patterns of Internet use. Although excessive patterns of Internet use was considered for inclusion in the DSM-5 with pathological gambling and substance-use disorders in a category of addictive disorders, it was determined that more research was needed on Internet-use behaviors before such actions be further considered and possibly undertaken. The present study is the first to investigate whether at-risk/problematic Internet use (ARPIU) may moderate the strength of association between problem-gambling severity and gambling-related characteristics and health and well-being measures in adolescents. Survey data from 1884 Connecticut high-school student stratified by Internet use (ARPIU vs. non-ARPIU) were examined in bivariate analyses and logistic regression models. Gambling-related characteristics and health and well-being measures were mostly positively associated with problem-gambling severity in both Internet use groups. Interaction odds ratio revealed that the strength of the

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### Contributors

Drs. Hoff, Krishnan-Sarin, Potenza and Steinberg designed the study. Dr. Pilver conducted statistical analyses. Ms. Yau conducted literature research and wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.addbeh.2013.09.003>.

associations between problem-gambling severity and marijuana, alcohol and caffeine use were stronger amongst the non-ARPIU compared to the ARPIU group, suggesting that the relationships between these substance use behaviors and problem gambling may be partially accounted for by ARPIU. Future studies should examine the extent to which preventative interventions targeting both problematic Internet use and problem gambling may synergistically benefit measures of health and reduce risk-taking behaviors in adolescence.

## Keywords

Problem gambling severity; Internet; Behavioral addiction; Substance use

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## 1. Introduction

Both gambling and Internet use are prevalent behaviors, including among youth. With the wide availability and popular use of the Internet, there is concern that some individuals may exhibit excessive or problematic use. Problematic Internet use (PIU) has been associated with substance-use disorders (SUDs), mood disorders, incarceration, legal troubles, and poor physical and mental health (Ko, Yen, Yen, Chen, & Chen, 2012; Liu, Desai, Krishnan-Sarin, Cavallo, & Potenza, 2011; Milani, Osualdella, & Di Blasio, 2009; Shapira, Goldsmith, Keck, Khosla, & McElroy, 2000; Shaw & Black, 2008); this pattern resembles that for problem gambling (PG) (Barry, Stefanovics, Desai, & Potenza, 2011; Morasco et al., 2006; Petry, Stinson, & Grant, 2005; Shaffer & Korn, 2002).

Adolescence may represent a vulnerable period for the development of problem behaviors including PG and PIU (Chambers & Potenza, 2003; DiClemente, Hansen, & Ponton, 1996; Ko, Yen, Chen, Yeh, & Yen, 2009). An estimated 95% of adolescents (aged 12–17 years) use the Internet; within this group, 46% go online multiple times daily (Pew Research, 2011). Prevalence estimates of PG and PIU among adolescents are generally higher than those among adults (Bakken, Wenzel, Götestam, Johansson, & Oren, 2009; Derevensky & Gupta, 2004; Johansson & Götestam, 2004; Liu et al., 2011; Shaffer, Hall, & Vander Bilt, 1999; Welte, Barnes, Tidwell, & Hoffman, 2008).

Although not included as a psychiatric diagnosis in the fourth edition (text revision) of the Diagnostic and Statistical Manual (DSM-IV-TR), PIU, or ‘Internet addiction’, has often been modeled after impulse-control disorders (American Psychiatric Association, 2000; Yau, Crowley, Mayes, & Potenza, 2012). The extent to which PIU exists as a distinct entity as opposed to the Internet serving as an outlet for other addictive behaviors (e.g., gambling, video-gaming, shopping) has been debated. In DSM-5, Internet gaming disorder has been introduced as a condition warranting further study. However, Internet gaming disorder focuses solely on the use of the Internet for video-gaming purposes, and PIU and problematic video-gaming may not overlap entirely and each may carry its own health correlates (Desai, Krishnan-Sarin, Cavallo, & Potenza, 2010; Liu et al., 2011). PIU, like PG, has been proposed as a non-substance or “behavioral” addiction (Holden, 2010; Leeman & Potenza, 2012; Potenza, 2006, 2008; Shaffer, 2001; Widyanto & Griffith, 2006; Yau, Crowley, et al., 2012). The behavioral-addiction perspective suggests that PIU and PG share characteristics of substance dependence such as tolerance, withdrawal and craving (Blanco, Moreyra, Nunes, Saiz-Ruiz, & Ibanez, 2001; Block, 2008; Grant, Brewer, & Potenza, 2006; Ko, Liu, et al., 2009). Individual addiction disorders (such as PIU and PG) may represent different expressions sharing common etiologies (Yau, Crowley, et al., 2012).

PIU frequently co-occurs with other psychiatric conditions, with one study indicating that 86% of individuals with PIU had another DSM-IV-TR diagnosis (Ahn, 2007). PIU may

preferentially co-occur with conditions related to the content browsed on the Internet (e.g., gambling, pornography or video-game-playing). In particular, parallels between Internet use and gambling have been proposed (Ko, Yen, Chen, Chen, & Yen, 2005; Tao et al., 2010; Yau, Potenza, & White, 2012; Young & Rogers, 1998). Personality traits that promote problematic engagement in Internet use might relate to gambling-related measures (e.g., tendencies to engage less in live-peer social forms of entertainment versus machine-based forms may relate to both PIU and online gambling) (Bernhard, Dickens, & Shapiro, 2012; Fioravanti, Dèttore, & Casale, 2012). It has been suggested that while “specific PIU” involves pathological use of the Internet for a specific purpose such as online gambling, “generalized PIU” describes a global set of behaviors that is both similar to and distinct from other behavioral addictions in availability and use of visual and auditory rewards—such differences may contribute to the unique features of PIU (Griffiths, 2003). Generalized PIU may exacerbate pre-existing problems associated with the contents to which it provides access. For example, individuals reporting problems controlling their engagement with technological devices (e.g., mobile phones, interactive television) that allow uninterrupted access to the Internet may be at greater risk of gambling-related problems (Phillips, Ogeil, & Blaszczynski, 2012).

Separately, PG and PIU are related to similar psychological and neurobiological profiles. PG is associated with impaired impulse control, substance use, depression, anxiety, and aggressive behaviors in adult and adolescent populations (Brewer & Potenza, 2008; Derevensky & Gupta, 2004; Kessler, Chiu, Demler, & Walters, 2005; Verdejo-García, Lawrence, & Clark, 2008), and similar factors appear associated with PIU (Dowling & Quirk, 2009; Ko et al., 2008, 2012; Weinstein & Lejoyeux, 2010; Yen, Ko, Yen, Wu, & Yang, 2007; Zhou et al., 2011). Given these findings, PIU may share etiological factors and may moderate the relationship between PG and other risk measures. A recent study examining data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) found stronger associations between subsyndromal levels of gambling and psychopathology in non-nicotine-dependent (versus nicotine-dependent) respondents (Grant, Desai, & Potenza, 2009). A similar pattern of findings was observed with respect to alcohol use among adolescents, with abstainers/low-frequency (versus moderate to high-frequency) drinkers reporting stronger associations between gambling and measures of drug use (Duhig, Maciejewski, Desai, Krishnan-Sarin, & Potenza, 2007). Thus, co-occurring SUDs may account for some of the variance in the associations between gambling behaviors and psychopathology and therefore weaken the association between problem-gambling severity and adverse health measures. In other words, given higher rates of health and well-being problems in the substance-using groups (including in the non-gambling comparison groups), lower odds ratios would be observed between problem-gambling severity and adverse health measures within the substance-using groups as compared to the non-substance-using groups. By extension, such a pattern of moderation of PIU on the associations between health-related factors and problem-gambling severity might be anticipated. However, how PIU and PG may interact with respect to other risk behaviors and health and functioning measures in youth has not been examined directly.

Previous research among adult (Engwall, Hunter, & Steinberg, 2004; Morasco et al., 2006; Petry et al., 2005) and adolescent populations (Ellenbogen, Derevensky, & Gupta, 2007; Jackson, Dowling, Thomas, Bond, & Patton, 2008; Yip et al., 2011) suggest that an additive relationship may exist between levels of gambling engagement and vulnerability to substance use and other risk behaviors. However, there is currently no existing research that investigates the potential moderating effects that PIU may have upon such associations. The present study aimed to fill this knowledge gap by examining health, functioning and gambling-related measures associated with problem-gambling severity in adolescents separately for at-risk problematic Internet users (ARPIU—defined by the presence of one or

more features of PIU) and non-at-risk problematic Internet users (those who endorse no features of PIU). Given the findings summarized above, we hypothesized that individuals with ARPIU compared to those without would show differences in problem-gambling severity and attitudes/perceptions reflecting greater permissiveness towards gambling. Furthermore, we hypothesized at-risk/problem gambling (ARPG) would be more strongly associated with various gambling characteristics related to motivations and behavior among adolescents with ARPIU compared to those without. We additionally hypothesized that PIU would moderate the association between problem-gambling severity and dysphoria/depression, aggressive behavior, and substance use. We hypothesized that these associations would be weaker among adolescents with ARPIU compared to those without as ARPIU may account for some aspects of the relationship between problem-gambling severity and health and well-being measures.

## 2. Methods

### 2.1. Participants

The present study analyzed data from a survey of risk behaviors in high-school students in Connecticut. Characteristics of the survey and sample have been described previously (Desai et al., 2010; Liu et al., 2011; Potenza et al., 2011; Rahman et al., 2012). Briefly, all public 4-year and non-vocational or special-education high schools in the state of Connecticut were invited to participate. Schools were offered an assessment of the risk behaviors associated with their respective student bodies as incentive for participation. After the initial rounds of recruitment, the response was insufficient in representing all geographic regions of the state. Thus, additional targeted recruitment was conducted to ensure adequate representation of under-represented regions within the sample. Although not a random sample, the final sample ( $N = 4523$ ) displayed demographics consistent with census data on Connecticut residents 14 to 18 years of age (Schepis, Desai, Smith, Potenza, & Krishnan-Sarin, 2008).

Of the 4523 adolescents taking the survey, only those who indicated any use of the Internet in a typical week, completed all questions related to Internet use, and completed all questions related to the inclusionary criteria for pathological gambling were included. From the entire sample, 2039 students were excluded for non-completion of the gambling sections (Yip et al., 2011), and a further 349 students were excluded for non-completion of the Internet sections. 251 students reported no Internet use in a typical week. Our final analytic sample included 1884 students (1050 males, 844 females). The racial/ethnic distribution was as follows: 75.5% Caucasian ( $n = 1422$ ), 9.4% African-American ( $n = 175$ ), 48.6% Asian ( $n = 915$ ), 13.7% Hispanic ( $n = 248$ ), and 14.1% Other ( $n = 265$ ).

### 2.2. Survey procedures

Passive consent procedures were utilized to obtain parental permission for children to participate in the survey. This procedure was approved by the participating schools and the Yale School of Medicine's institutional review board. The survey was administered at each school on a single day by a research team. A member of the team described the survey and answered students' questions prior to the start of the survey. Students were reminded that participation was voluntary and answers were anonymous. Individuals wishing not to participate or those whose parents refused students' participation were instructed to sit quietly and complete other work. A pen was offered to each student for participation. The refusal rate for participation was lower than 1%.

Most measures in the survey were adapted directly from the CDC (Center for Disease Control) Youth Risk Behavior Survey (Eaton et al., 2006). Information regarding the reliability and validity of the core questionnaire is published elsewhere (Brener et al., 2002).

### 2.3. Socio-demographics

Socio-demographic variables assessed in the present analysis included self-reported gender, race (not mutually exclusive, binary; African-American, Caucasian, Asian, Other race), ethnicity (Hispanic, Not Hispanic), grade level (9th, 10th, 11th or 12th), grade average (A + B, C, D + F), and familial structure (living with one parent, two parents, or other [e.g., “foster family”, “grandparents”, and “other relatives”]).

### 2.4. At-risk/problematic Internet use

For those respondents who acknowledged any Internet use in a typical week, an additional six questions were asked (Liu et al., 2011; Yau, Potenza, et al., 2012): (1) “Have you ever tried to cut back on your Internet use?”, (2) “Has a family member ever expressed concern about the amount of time you use the Internet?”, (3) “Have you ever missed school, work, or important social activities because you were using the Internet?”, (4) “Do you think you have a problem with excessive Internet use?”, (5) “Have you ever experienced an irresistible urge or uncontrollable need to use the Internet?”, and (6) “Have you ever experienced a growing tension or anxiety that can only be relieved by using the Internet?” Given that there is no official threshold between problematic and non-problematic Internet use behavior and consistent with prior thresholding (Yau, Potenza, et al., 2012), individuals who endorsed one or more of the six PIU questions were classified as having “at-risk/problematic Internet use” (ARPIU). Those who endorsed none of the six questions were classified as non-ARPIU. These questions were based on those from the Minnesota Impulsive Disorder Interview (MIDI), a valid and reliable instrument used to screen for impulse-control disorders (Grant, 2008; Grant, Levine, Kim, & Potenza, 2005).

### 2.5. Problem-gambling severity

Problem-gambling-severity groups were based on *DSM-IV-TR* criteria (American Psychiatric Association, 2000) as assessed by questions from the Massachusetts Gambling Screen (MAGS; Shaffer, LaBrie, Scanlan, & Cummings, 1994), a valid and reliable measure (Shaffer et al., 1994). When more than a single MAGS item corresponding to the same criterion (e.g. tolerance) was endorsed, a single point was awarded for endorsing either item, as done previously (Potenza et al., 2011; Rahman et al., 2012). Participants who reported no gambling in the past-year were classified as being non-gambling (NG). Those who reported past-year gambling but did not acknowledge any *DSM-IV* criteria were classified as having low-risk gambling (LRG). Participants who endorsed one or more *DSM-IV* criteria were classified as having at-risk/problem gambling (ARPG), as in previous studies (Barry et al., 2011; Kundu et al., 2013; Potenza et al., 2011; Rahman et al., 2012).

### 2.6. Gambling perceptions

Gambling behavior and characteristics were queried by gambling types and location, motivations to gamble, gambling frequency and age of gambling onset. Participants were informed that gambling constituted as “any game you bet on for money or anything else of value”. Gambling perception was assessed through questions probing adolescents’ perceptions of their own and their perceived parental attitudes towards gambling, importance of prevention strategies, and family concerns about gambling (coded as disapprove, neither approve nor disapprove, approve; yes/no; or important/not important), as described previously (Kundu et al., 2013).

## 2.7. Health and well-being measures

Involvement in extracurricular activities (yes, no) indicates past-year participation in any of the following activities: team sports, school clubs, or part-time employment. Past year dysphoria/depression (feelings of sadness or hopelessness almost every day for 2 or more weeks in a row) and aggression (carrying a weapon within the past 30 days or getting into physical fights in the past year) were also assessed. Weight was defined as one of the four categories based on the individual's body mass index (BMI): "underweight" (BMI < 18.5), "normal" (BMI = 18.6–24.9), "overweight" (BMI = 25–29.9) or "obese" (BMI ≥ 30).

Lifetime substance-use variables included cigarette smoking (never, occasionally, regularly) marijuana use (ever, never), alcohol use (ever, never), use of other drugs (ever, never).

Current alcohol use was coded into one of the four categories reflecting drinks per month: "never regular" (1–5 days), "light" (6–9 days), "moderate" (10–19 days), or "heavy" (20–30 days). Caffeine use was classified as one of the three categories: "none", "1–2 per day", and "3+ per day".

## 2.8. Gambling motivations and behavior

Types of gambling were assessed and coded as "strategic" (card games, craps and games of skill), "non-strategic" (traditional and instant (scratch card) lotteries and bingo), and "machine" (slot machine, poker machines, and other gambling machines). Participants were queried regarding where they have gambled (online, school and casino). Gambling urges were assessed through items regarding pressure to gamble ("Do you ever feel pressure to gamble when you do not gamble?") or gambling-related anxiety ("In the past year have you ever experienced a growing tension or anxiety that can only be relieve by gambling"). Gambling motivations were assessed with responses grouped in four categories including gambling for: excitement (fun and entertainment), financial reasons (to win money), escape (to relieve dysphoria), and social reasons (to socialize with friends or under peer pressure). Gambling partners were assessed and classified as gambling with "family", "friends", "other adults", "strangers", and "alone". Gambling duration was classified as either "1 h or less" or "2 or more hours" per week. Age of gambling onset was categorized as " 8 years", "9–11 years", "12–14 years" and " 15 years".

## 2.9. Data analysis

To ensure and verify accuracy, all data were double-entered from the paper surveys into the electronic database, reviewed to ensure within-range values and randomly spot-checked. Statistical analyses were conducted using SAS software v.9.4 (SAS Institute Inc., Cary, NC). Bivariate analyses were conducted with chi-squared tests of association. To calculate the unique effects of problem-gambling severity among ARPIU and non-ARPIU individuals, we fit separate binomial and multinomial logistic regression models for binary and categorical outcomes, respectively. To test whether the ARPIU moderated effects of problem-gambling severity, we constructed interaction models that included the main effects of ARPIU and problem-gambling severity, as well as the ARPIU-by-problem-gambling-severity interaction terms, using the full sample. These models were adjusted for gender, race, Hispanic ethnicity, grade level, grade average, and familial structure. We present the adjusted odds ratios (ORs) and corresponding 95% confidence intervals (CIs) for ARPIU and non-ARPIU individuals, as well as the interaction ORs and their corresponding 95% CIs. The interaction ORs are the ratios of effects among adolescents characterized as having ARPIU compared to adolescents characterized as not having ARPIU ( $OR_{ARPIU}/OR_{NON-ARPIU}$ ). CIs that do not include 1.0 indicate statistical significance at  $p < 0.05$ . ORs greater than 2.0, 3.0, or 4.0 reflects a small, moderate or strong effect sizes, respectively, when the condition group (ARPIU) is more affected (Ferguson, 2009). ORs smaller than 0.5,

0.33, or 0.25 reflect a small, moderate or strong effect size respectively when the control group (non-ARPIU) is more affected (Ferguson, 2009).

### 3. Results

#### 3.1. Prevalence estimates and socio-demographics

Almost half (48.6%) of the adolescents met criteria for ARPIU. Problem-gambling severity was associated with ARPIU ( $\chi^2 = 18.66, p < .0001$ ); the proportions of PIU items endorsed by problem-gambling severity are presented (Table 1). The frequency of ARPG was higher among the ARPIU group compared to the non-ARPIU group (28.5% vs. 24.2%), and the frequency of LRG was lower among the ARPIU compared to non-ARPIU group (52.1% vs. 61.7%). ARPIU was associated with gender, Asian race, Hispanic ethnicity, and grade level (all  $p < .05$ ; Supplementary Table 1).

#### 3.2. Gambling perceptions

Bivariate analyses of gambling perceptions are presented (Supplementary Table 2). The ARPIU group, in contrast to the non-ARPIU group, was more likely to report that their parents disapproved of gambling ( $\chi^2 = 15.72, p = .0004$ ) and that their family had expressed concerns regarding their gambling behavior ( $\chi^2 = 6.31, p = .012$ ). Individuals generally considered all proposed gambling prevention strategies to be important; no significant differences were found between ARPIU and non-ARPIU individuals in most gambling-related perceptions and attitudes ( $p > .05$ ).

#### 3.3. Health and well-being measures

Bivariate analyses for health and well-being measures are presented (Supplementary Table 3). Among ARPIU respondents, problem-gambling severity was associated with participation in extracurricular activities, carrying a weapon, engaging in a serious fight, lifetime tobacco smoking, lifetime marijuana use, lifetime other drug use, and caffeine use (all  $p < .05$ ). Similar associations were observed among non-ARPIU respondents; problem-gambling severity was associated with participation in extracurricular activities, carrying a weapon, engaging in a serious fight, tobacco smoking, marijuana use, alcohol use, and caffeine use (all  $p < .05$ ).

In multivariate analyses (Table 2), amongst ARPIU respondents, LRG adolescents were more likely than NG adolescents to report participation in extracurricular activities (OR = 1.71, 95% CI [1.11, 2.64]), occasional (OR = 1.76, 95% CI [1.11, 2.79]) and regular smoking (OR = 2.51, 95% CI [1.20, 5.25]), and caffeine use 3+ times per day (OR = 1.98, 95% CI [1.09, 3.58]). Amongst ARPIU respondents, ARPG adolescents compared to NG adolescents were more likely to report participation in extracurricular activities (OR = 2.69, 95% CI [1.58, 4.59]), dysphoria/depression (OR = 1.95, 95% CI [1.18, 3.22]), carrying a weapon (OR = 2.96, 95% CI [1.60, 5.46]), engaging in a serious fight (OR = 3.93, 95% CI [1.62, 9.51]), occasional (OR = 2.65, 95% CI [1.56, 4.50]) and regular smoking (OR = 5.13, 95% CI [2.31, 11.38]), marijuana use (OR = 2.14, 95% CI [1.31, 3.50]), heavy alcohol use (OR = 10.79, 95% CI [2.12, 54.93]), and other drug use (OR = 3.56, 95% CI [1.51, 8.39]). Amongst non-ARPIU respondents, LRG adolescents were more likely than NG adolescents to report carrying a weapon (OR = 2.97, 95% CI [1.41, 6.17]), occasional smoking (OR = 2.23, 95% CI [1.26, 3.93]), marijuana use (OR = 2.75, 95% CI [1.67, 4.53]), moderate (OR = 2.68, 95% CI [1.24, 5.83]) and heavy alcohol use (OR = 3.21, 95% CI [1.01, 10.23]), and caffeine use 1–2 times per day (OR = 2.27, 95% CI [1.39, 3.71]) and 3+ times per day (OR = 5.26, 95% CI [2.64, 10.48]). Amongst non-ARPIU respondents, ARPG adolescents compared to NG adolescents were more likely to report extracurricular activities (OR = 1.85, 95% CI [1.04, 3.29]), carrying a weapon (OR = 5.46, 95% CI [2.55, 11.72]), occasional

(OR= 3.78, 95% CI [2.01, 7.11]) and regular smoking (OR = 2.53, 95% CI [1.17, 5.47]), marijuana use (OR=4.09, 95% CI [2.32, 7.21]), light (OR = 2.63, 95% CI [1.13, 6.11]), moderate (OR = 5.96, 95% CI [2.45, 14.50]) and heavy alcohol use (OR = 8.23, 95% CI [2.37, 28.59]), and caffeine use 3+ times per day (OR = 4.28, 95% CI [2.00, 9.15]).

Interaction odds ratios tested whether the odds ratio for ARPIU were significantly different than those for non-ARPIU. ARPIU moderated the relationships between problem-gambling severity and several measures of health and well-being (Fig. 1). The associations among non-ARPIU were generally stronger, and in several cases the differences reach statistical significance across PIU groups. For example, LRG was less strongly associated with marijuana use (Interaction OR = 0.44, 95% CI [0.23, 0.84]) and caffeine use 3+ times per day (Interaction OR = 0.36, 95% CI [0.15, 0.88]) among ARPIU compared to non-ARPIU youth. ARPG was less strongly associated with light alcohol use (Interaction OR=0.32, 95% CI [0.11, 0.95]) and moderate alcohol use (Interaction OR = 0.23, 95% CI [0.07, 0.72]) among ARPIU compared to non-ARPIU youth.

Within both the ARPIU and non-ARPIU groups, and as compared to the NG group, estimates of co-occurring health and well-being problems were typically higher in the LRG group and higher still in the ARPG group. This pattern of stepwise progression for increasingly large odds ratio with increasing problem-gambling severity was more pronounced among non-ARPIU compared to ARPIU youth, potentially as a result of higher frequencies of health and well-being problems in ARPIU youth included in the non-gambling baseline comparison group (Fig. 1). This effect was observed in marijuana use and moderate alcohol use and was arguably most clear in caffeine use of 3 or more drinks per day. However, the relationship with respect to light alcohol use appeared to reflect a decrease in the proportion of ARPIU individuals acknowledging light alcohol use with increasing problem-gambling severity (Fig. 1).

### 3.4. Gambling motivations and behaviors

Bivariate analyses for gambling characteristics are shown in supplementary Table 4. Among ARPIU respondents, ARPG was significantly associated with gambling characteristics including mechanized gambling, location, urges, motivations, partners, and duration. Similar associations were observed among non-ARPIU respondents. In both Internet-use groups, strategic gambling type, non-strategic gambling type and age of onset of gambling were not associated with ARPG. Interaction ORs (supplementary table 5) did not reach statistical significance for any measures (all  $p > 0.05$ ), suggesting that the associations between ARPG and gambling characteristics are not moderated by ARPIU.

## 4. Discussion

### 4.1. Summary of results

To our knowledge, the present study is the first to directly investigate the potential moderating effects that ARPIU may have on the relationships between problem-gambling severity and various health, functioning and gambling measures in a large sample of adolescents. In both Internet use groups, problem-gambling severity was associated with greater likelihood of reporting gambling-related motivations and behaviors as well as adverse health and well-being measures. Moderating effects were found with respect to the association between problem-gambling severity and several measures of substance use; consistent with our *a priori* hypothesis, these associations were weaker amongst the ARPIU compared to the non-ARPIU group.



## 4.2. Relationships between ARPIU and gambling—frequencies of problem-gambling severity and gambling-related attitudes and behaviors

Analyses revealed a significant relationship between ARPIU and problem-gambling severity that suggested that ARPG is more frequent amongst ARPIU adolescents than amongst non-ARPIU adolescents. This is similar to findings from previous small-scale studies that suggest PG and PIU exhibit frequent co-occurrence among adults (Shapira et al., 2000; Young, 1998) and youths (Dowling & Brown, 2010). Thus, prevention and treatment strategies that target PIU may also help diminish underage involvement in gambling, although this possibility warrants direct examination.

Adolescent's belief about activities such as gambling may be shaped by information from and behavior of parents (Bandura, 1986; Furnham, 1986). The present study found that ARPIU adolescents, in comparison to non-ARPIU adolescents, were more likely to report parental disapproval of and family concern for gambling behaviors. One possible explanation for this finding in the setting of the association between ARPIU and problem-gambling severity is that the familial concern for gambling reflects the relationship between ARPIU and problem-gambling severity, with greater disapproval of gambling and family concern for gambling relating to ARPG behaviors. Alternatively, the findings may reflect an environment characterized by parental over-protection in which adolescents may, in rebellion of their parents, engage in behaviors of which their parents disapprove (Baumrind, 1987). Previous research indicate that higher parental protection in combination with low parental care ('affectionless control') is associated with PG (Floros, Siomos, Fisoun, & Geroukalis, 2013; Grant & Kim, 2002) as well as SUDs (Schweitzer & Lawton, 1989; Torresani, Favaretto, & Zimmermann, 2000); further research that directly assess these measures in the context of PIU is needed. While some types of parenting behavior may be risk factors for PG, it is likely that PG's etiology is multifactorial and alternate domains (e.g., schools, peers, impaired impulse control) are important to consider in the relationships between ARPG and ARPIU and those between ARPIU and gambling-related attitudes and behaviors.

## 4.3. Relationships between ARPIU, problem-gambling severity and health and functioning

Consistent with previous data (Goldstein, Walton, Cunningham, Resko, & Duan, 2009; Lynch, Maciejewski, & Potenza, 2004; Yip et al., 2011), findings from the present study indicate that problem-gambling severity can be associated with a range of adverse health consequences, with the largest odds typically observed in association with more severe gambling pathology. In the non-ARPIU group, associations between problem-gambling severity and measures of lifetime marijuana and heavy caffeine use at the level of LRG and measures of light and moderate current alcohol use at the level of ARPG were significant. The finding that the relationships between these substance-use measures and problem-gambling severity were weaker in the ARPIU group as compared to the non-ARPIU group suggests that some aspects of the relationships between greater problem-gambling severity and substance use are attributable to ARPIU. These aspects may include shared biological factors and/or temperamental characteristics. For example, elevated impulsivity may contribute similarly to participation in these addiction-related behaviors (Dong, Lu, Zhou, & Zhao, 2010; Dong, Zhou, & Zhao, 2011; Kim et al., 2011; Leeman & Potenza, 2012; Yuan et al., 2011). These and other possibilities need further study.

## 4.4. Limitations and future directions

Potential factors underlying the relationship between PIU and PG (e.g., genetic factors, early life stressors, and personality traits) warrant additional investigation, particularly within a developmental framework. Identifying specific vulnerability factors that may promote maladaptive participation in Internet use, gambling or risk-taking behaviors could aid in

school-based and clinical interventions. Public health policies that adopt a multi-modal approach that targets both Internet and gambling may synergistically benefit in limiting the onset of at-risk behaviors. Education and increasing awareness of the negative health outcomes and risks associated with PIU and PG may help teach adolescents how best to cope with the challenges of convenient Internet use and gambling in all their forms. Similar information should also be made available to parents, teachers, health professionals and other practitioners. Specific interventions (e.g., age verification, monitoring school computers, and enforcing time limits) warrant consideration, as do behavioral and pharmacological approaches to PIU and PG.

The current study presents novel results from a large sample of adolescents. Nonetheless, the findings should be considered within the context of several limitations. First, the sample was not nationally representative; therefore, generalizability may be limited to adolescents within the geographic region sampled. Second, the self-report methodology employed is subject to biases that may lead to either over-reporting or under-reporting. It is possible, for example, a “badge-of-honor” effect may motivate adolescents to claim endorsement of Internet use items as a sign of a serious or experienced user leading to an exaggerated prevalence estimate. Third, the present study did not account for the different contexts of Internet use (Block, 2008). It is possible that particular contexts of Internet use (e.g., online gaming that share structural characteristics of gambling including visual stimulus rewards, rewards for winning or “correct” behavior, and keeping of a digital score) may be more strongly associated with problem-gambling severity. Future research is needed to investigate these potential relationships. Fourth, the data are cross-sectional. Longitudinal studies are needed to examine the extent to which gambling and Internet-use behaviors may interact over developmental epochs, and to examine the implications on health throughout the lifespan. Fifth, although a strength of the study lies in the use of criteria based on symptoms/features of PIU rather than on the basis of frequency of use, the current lack of formal diagnostic criteria for PIU limits the study and the field in general. Moreover, although the low-level pattern of engagement and dichotomous categorization of ARPIU and non-ARPIU have been associated with negative health measures in previous studies during adolescence (Liu et al., 2011) and later in life (Yau, Potenza, et al., 2012), this approach may dilute the effects by grouping together individuals with more and less severe patterns of behavior. Further studies employing measures with more dimensions (e.g., distinguishing at-risk from more severe PIU in larger samples) may generate a better understanding of PIU and how it interacts with other conditions and behaviors.

## 5. Conclusion

Adolescence represents a vulnerable developmental period for the engagement in risk behaviors and development of addictions (Chambers & Potenza, 2003; Chambers, Taylor, & Potenza, 2003). Not surprisingly, high frequencies of adolescents reported features of PIU and/or PG. Importantly, the current study suggests that adolescents who exhibit features of both excessive gambling and Internet-use behaviors may represent a distinct category separate from individuals who only exhibit features of excessive gambling. This study is the first to consider the potential moderating effects that ARPIU may have on the relationships between problem-gambling severity and various measures of health, well-being and gambling-related motivations and behaviors. The findings indicate that the strengths of the associations between problem-gambling severity and measures of substance use may be moderated by whether individuals endorse features of PIU. Importantly, the current data raise concern that even at-risk engagement in gambling and Internet use may be associated with a range of adverse health measures in an interactive fashion. Given the popularity of both gambling and Internet use as recreational activities, it is important to be aware of the potential public health concerns posed by subsyndromal levels of engagement in these

behaviors (Shaffer et al., 2004). Partaking in addictive behaviors like at-risk or problematic gambling during adolescence may have long-lasting effects into adulthood (Gupta & Derevensky, 1998; Welte, Barnes, Wieczorek, Tidewell, & Parker, 2001); future research that addresses the potential moderating effect PIU may have on such relationships over time is needed, as are the potential long-term relationships with ARPIU on health and well-being. Treatment and prevention strategies that target both PIU and PG may synergistically improve multiple measures of health and reduce risk-taking behaviors (particularly those related to substance use) in adolescence.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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## Abbreviations

<b>PIU</b>	Problematic Internet Use
<b>ARPIU</b>	At-risk/Problematic Internet Use
<b>PG</b>	Problem Gambling
<b>NG</b>	Non-Gambling
<b>LRG</b>	Low-Risk Gambling
<b>ARPG</b>	At-risk/Problem Gambling

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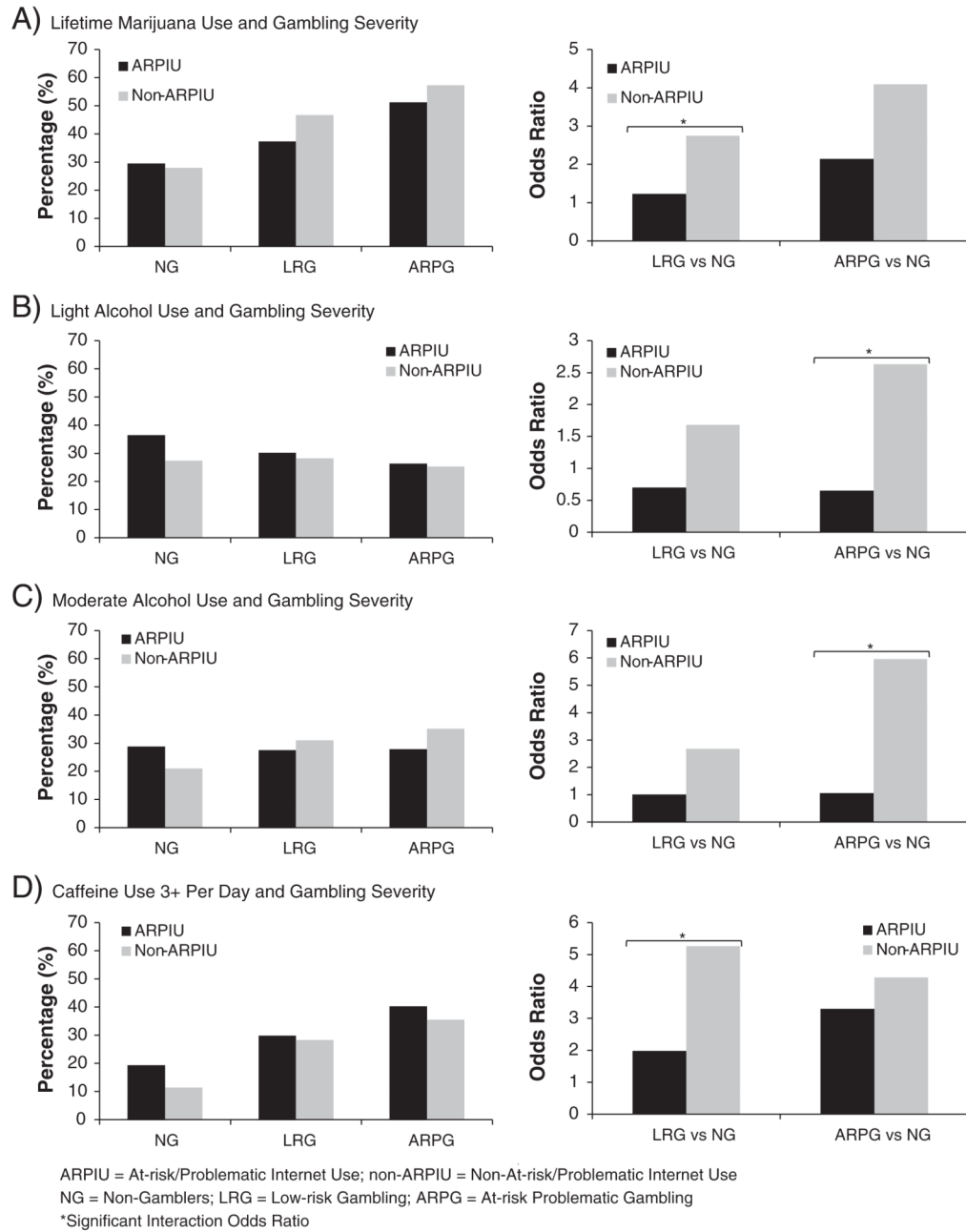
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**HIGHLIGHTS**

- Investigated associations between problem-gambling severity and health measures.
- Examined whether ARPIU moderated the strengths of these associations.
- Weaker associations with substance-use behaviors in ARPIU adolescents.
- ARPIU accounts for some of the links between gambling and substance-use behaviors.





**Fig. 1.** Percentages and interactions with ARPIU in the association between health and well-being measures and gambling severity. ARPIU = At-risk/Problematic Internet Use; non-ARPIU = Non-At-risk/Problematic Internet Use. NG = Non-Gamblers; LRG = Low-risk Gambling; ARPG = At-risk Problematic Gambling. \* Significant Interaction Odds Ratio.

**Table 1**

Number of PIU item endorsement by gambling severity status.

Number of PIU items endorsed	NG		LRG		ARPG	
	N	%	N	%	N	%
1	73	41.2	214	44.9	85	32.6
2	49	27.7	120	25.2	53	20.3
3	25	14.1	63	13.2	52	19.9
4	10	5.7	45	9.5	46	17.6
5	11	6.2	24	5.0	17	6.5
6	9	5.1	11	2.3	8	3.1

PIU = Problematic Internet Use; NG = Non-Gamblers; LRG = Low-risk Gambling; ARPG = At-risk Problematic Gambling.

**Table 2**

Multivariate-adjusted associations with health and well-being measures.

Variable	ARPIU			Non-ARPIU			Interaction OR (ARPIU vs. non-ARPIU)					
	LRG vs NG	ARPG vs NG	OR	LRG vs NG	ARPG vs NG	OR	LRG vs NG	ARPG vs NG	OR			
	95% CI	95% CI		95% CI	95% CI		95% CI	95% CI				
<b>Academic/Extracurricular</b>												
Any extracurricular activities	1.71	1.11–2.64	2.69	1.58–4.59	1.52	0.94–2.44	1.85	1.04–3.29	1.01	0.54–1.89	1.13	0.55–2.35
<b>Mood</b>												
Dysphoria/Depression	1.26	0.82–1.96	1.95	1.18–3.22	1.28	0.67–2.44	2.28	1.09–4.78	0.96	0.45–2.06	0.86	0.38–1.97
<b>Aggression</b>												
Carry weapon	1.48	0.83–2.66	2.96	1.60–5.46	2.97	1.43–6.17	5.46	2.55–11.72	0.51	0.20–1.29	0.59	0.23–1.52
Serious fight	1.89	0.80–4.44	3.93	1.62–9.51	1.60	0.46–5.58	3.52	0.98–12.70	1.09	0.25–4.89	1.19	0.26–5.36
<b>Substance use</b>												
<b>Smoking</b>												
Never	Ref	–	Ref	–	Ref	–	Ref	–	Ref	–	Ref	–
Occasionally	1.76	1.11–2.79	2.65	1.56–4.50	2.23	1.26–3.93	3.78	2.01–7.11	0.79	0.38–1.62	0.73	0.33–1.59
Regularly	2.51	1.20–5.25	5.13	2.31–11.38	1.89	0.97–3.69	2.53	1.17–5.47	1.31	0.49–3.49	2.40	0.83–6.89
Marijuana	1.23	0.80–1.89	2.14	1.31–3.50	2.75	1.67–4.53	4.09	2.32–7.21	0.44	0.23–0.84	0.53	0.26–1.07
<b>Alcohol, current</b>												
Never regular	Ref	–	Ref	–	Ref	–	Ref	–	Ref	–	Ref	–
Light	0.70	0.34–1.44	0.65	0.29–1.47	1.68	0.82–3.43	2.63	1.13–6.11	0.46	0.17–1.24	0.32	0.11–0.95
Moderate	1.01	0.48–2.13	1.06	0.45–2.47	2.68	1.24–5.83	5.96	2.45–14.50	0.40	0.14–1.15	0.23	0.07–0.72
Heavy	4.39	0.93–20.81	10.79	2.12–54.93	3.21	1.01–10.23	8.23	2.37–28.59	1.23	0.18–8.34	0.90	0.13–6.48
Other drug	0.92	0.40–2.11	3.56	1.51–8.39	1.37	0.61–3.11	1.54	0.62–3.83	0.64	0.20–2.01	2.46	0.75–8.03
<b>Caffeine use</b>												
None	Ref	–	Ref	–	Ref	–	Ref	–	Ref	–	Ref	–
1–2 per day	1.27	0.77–2.09	1.40	0.76–2.59	2.27	1.39–3.71	1.27	0.71–2.28	0.54	0.27–1.06	0.94	0.43–2.07
3+ per day	1.98	1.09–3.58	3.30	0.76–2.59	5.26	2.64–10.48	4.28	2.00–9.15	0.36	0.15–0.88	0.70	0.26–1.85

ARPIU = At-risk/Problematic Internet Use; non-ARPIU = Non-At-risk/Problematic Internet Use; NG = Non-Gamblers; LRG = Low-risk Gambling; ARPG = At-risk Problematic Gambling.



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## Gambling-Related Attitudes and Behaviors in Adolescents Having Received Instant (Scratch) Lottery Tickets as Gifts

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### Abstract

**Objective**—Instant (scratch) lottery ticket gambling is popular among adolescents. Prior research has not determined whether adolescents' gambling behavior and attitudes toward gambling are influenced by the receipt of scratch lottery tickets as gifts.

**Method**—Cross-sectional survey data from 2,002 Connecticut high school students with past-year gambling were analyzed using bivariate approaches and logistic regression analyses. Interactions between gambling-problem severity and lottery-gift status were examined in relation to multiple outcomes.

**Results**—Adolescents who received a scratch lottery ticket as a gift compared with those who did not were more likely to report features of problem gambling, buy scratch lottery tickets for themselves, and buy and receive other types of lottery tickets; they were also less likely to report parental disapproval of gambling and to see gambling prevention efforts as important. Later ( 15 years) age-at-gambling-onset was inversely linked to gambling-problem severity in the lottery gift group (odds ratio [OR] = .38) but not in the nongift group (OR = .91), yielding a significant severity by gift status interaction. Other academic, health, and gambling-related correlates of gambling-problem severity were similar in the gift and nongift groups.

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### Appendix. Supplementary Material

Supplementary data related to this article can be found online at <http://dx.doi.org/10.1016/j.jadohealth.2012.07.013>

**Conclusions**—For adolescents, the receipt of scratch lottery tickets as gifts during childhood or adolescence was associated with risky/problematic gambling and with gambling-related attitudes, behaviors, and views suggesting greater gambling acceptability. The extent to which the receipt of scratch lottery tickets may promote gambling behaviors and the development of gambling problems warrants consideration. Education, prevention, and treatment strategies should incorporate findings relating to receipt of gambling products by underage individuals.

### Keywords

Gambling; Adolescence; Lottery; Risk behaviors; Gifts

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High rates of adolescent gambling exist worldwide [1,2]. In North America, more than 15 million adolescents (ages 12–17 years) have gambled, and over two million have experienced gambling problems [1,3]. Many youths gamble on lotteries despite age restrictions prohibiting their participation [3,4]. Although the sale of lottery tickets to minors is illegal [4,5], parents often buy lottery tickets for their children. Minors who receive lottery tickets as gifts may be more likely to participate in lotteries and possibly other forms of gambling. The receipt of lottery tickets as gifts may also influence adolescents' perceptions of the acceptability of gambling [4,6], including their views of problem gambling prevention efforts, parental attitudes toward gambling, and underage participation in gambling.

Data suggest that 4% to 8% of adolescents exhibit gambling problems, with another 10% to 15% at significant risk [1,7]. Problem gambling is characterized by interfering or excessive patterns of gambling, and pathologic gambling is a formal psychiatric condition [8]. Given that gambling during adolescence, particularly problem and pathological gambling, has been linked to poorer functioning (e.g., higher rates of depression and substance use, abuse, and dependence) both during adolescence and later in life, it is important to understand the factors that may contribute to gambling behaviors among youth [1,9–13]. Furthermore, inasmuch as risky patterns of gambling not meeting the threshold of pathologic gambling are relevant to youth, recent studies of youth gambling have investigated at-risk/problem gambling (ARPG) [12,14].

In this study, we examined the gambling attitudes and behaviors of high school students according to their status as recipients of gifted lottery tickets. We hypothesized that ticket-gifted adolescents would be more likely to report ARPG, have family members with gambling problems, purchase lottery tickets, perceive their parents as being more approving of gambling, view problem-gambling-prevention efforts as less important, and have an earlier age at gambling onset, compared with non-ticket-gifted adolescents. We also examined the correlates of ARPG in the adolescents who did and did not receive lottery scratch tickets as gifts, as understanding the features related to ARPG might help parents, teachers, administrators, and clinicians identify youth who might be exhibiting risky or problematic gambling, thus facilitating early intervention. We hypothesized that gambling-problem severity as indexed by ARPG would be more strongly associated with adverse health measures (dysphoria/depression and substance use) and participation in forms of gambling related to lotteries (i.e., nonstrategic forms) among adolescents who received scratch tickets as gifts compared with those who did not.

### Method

The present study examined gambling and other risk behaviors among high school students in Connecticut, focusing on lottery-gift status as defined by responses (yes/no) indicating whether participants had “ever received a lottery scratch ticket as a gift in the past year.” Inasmuch as details of study design, recruitment, and measures used have been published

previously [11,12,15–18], and given the space limitations in the journal, a detailed description of these methods is provided in Supplemental materials.

## Data analysis

Data were entered from paper into an electronic system. Data cleaning procedures and spot checks of completed surveys were performed to ensure that data were accurate and within range. All statistical analyses were conducted using the SAS system (SAS Institute, Cary, NC). We examined the bivariate relationship between lottery-gift status and demographic characteristics, as well as the bivariate relationship between lottery-gift status and gambling measures. We also examined the bivariate relationship between gambling-problem severity and demographic characteristics, stratified by lottery-gift status. Statistical significance was determined with Pearson  $\chi^2$  tests. A Bonferroni correction was applied such that  $p$  values  $< .0025$  were considered statistically significant.

We next constructed logistic regression models for binary dependent variables and multinomial logistic regression models for categorical dependent variables and ran separate models according to lottery-gift status to determine the lottery-gift-status-specific effect of gambling-problem severity. To determine whether the effect of gambling-problem severity differed according to lottery-gift status, we constructed a model that included the main effects of gambling-problem severity and lottery-gift status, as well as the interaction term (gambling-problem severity\*lottery-gift status). We present the stratum-specific odds ratios (ORs) and 95% confidence intervals (CIs), as well as the interaction OR and 95% CI. The interaction OR is the ratio of the stratum-specific effects; CIs that excluded 1.0 indicated a statistically significant interaction. All models were adjusted for gender, race/ethnicity, grade level, and family structure. Post-hoc analyses separating the ARPG group into at-risk gambling (ARG; those acknowledging one to two inclusionary criteria for PG) and problem/pathologic gambling (PPG; those acknowledging three or more inclusionary criteria for PG) groups were performed to investigate whether the relationships between health, functioning, and gambling measures differed across gift and nongift groups according to this gambling-problem-severity stratification.

## Results

### Instant-lottery-gift status and gambling-problem severity

Of the 2,022 reported adolescent gamblers, 1,052 (52.5%) reported having received lottery scratch tickets as gifts. Among those who received lottery scratch tickets as gifts, 78.4% ( $n = 825$ ), 14.5% ( $n = 152$ ), 3.1% ( $n = 33$ ), and 4.0% ( $n = 42$ ) received tickets less than monthly, monthly, weekly, and daily, respectively. Lottery gift status was associated with greater gambling-problem severity ( $\chi^2 = 13.83$ ;  $p = .0002$ ). Among adolescents receiving lottery tickets as gifts, the prevalence of ARPG was 38.7%; the prevalence of ARPG was 29.9% among adolescents who did not receive lottery tickets as gifts.

### Lottery-gift status and sociodemographic characteristics

Lottery gift status was associated with Caucasian, African-American, Hispanic, and Other race/ethnicity (all  $p < .0001$ ) and family structure ( $p < .0041$ ) but not with age, grade level, or gender (Table 1).

### Lottery-gift status and gambling measures

Lottery-ticket-gifted as compared to lottery-ticket-non-gifted adolescents were more likely to report earlier ages at gambling onset, buy instant lottery tickets for themselves, buy other types of lottery tickets, and receive as gifts other types of lottery tickets (all  $p < .0001$  to  $p < .0007$ ; Table 2). Perceived parental perception of gambling was associated with the

lottery-gift status ( $p < .0001$ ), with parental disapproval of gambling less prevalent among lottery gift recipients. The lottery-gift group was less likely than the nongift group to acknowledge as important hanging out with nongambling friends ( $p < .0001$ ), participating in nongambling fun activities ( $p = .0010$ ), receiving warnings about gambling from adults in the family ( $p = .0016$ ) or peers ( $p = .0014$ ), having nongambling parents ( $p < .0001$ ), learning about gambling-related risks from parents ( $p < .0001$ ) or at school ( $p < .0008$ ), and having parents who did not permit card games for money at home ( $p < .0019$ ). Overall, compared with non-ticket-gifted youth, ticket-gifted adolescents were less likely to see gambling prevention efforts as important. Another variable approached significance at the Bonferroni-corrected  $p$ -value threshold (parental strictness about gambling;  $p = .0029$ ) and others were significant at  $p < .05$  but not at the Bonferroni-corrected threshold: checking identification when purchasing lottery tickets ( $p = .0069$ ), advertisements about problem gambling ( $p = .016$ ), learning about the risks of gambling from peers ( $p = .0099$ ), and adults not involving children in gambling ( $p = .042$ ).

### Gambling-problem severity and sociodemographics

Among ticket-gifted adolescents, gender, Caucasian, African-American, Asian, and Hispanic race/ethnicity, and family structure were associated with problem gambling severity (all  $p < .05$ ), with ARPG respondents less likely than low-risk gambling (LRG) respondents to be Caucasian, and more likely to be male, African-American, Asian, and Hispanic and report their family structure as "other." Among non-ticket-gifted adolescents, gender, Caucasian and African-American race/ethnicity were associated with problem-gambling severity (all  $p < .05$ ; Table 3), with ARPG respondents less likely than LRG respondents to be Caucasian and more likely to be male, African-American, Asian, and Hispanic.

### Gambling-problem severity correlates

Among ticket-gifted adolescents, ARPG versus LRG youth were more likely to report grades of D or lower (OR = 2.02;  $p < .0001$ ), occasional or regular tobacco use (ORs = 1.44 and 1.95, respectively;  $p = .001$ ), marijuana use (OR = 1.79;  $p < .0001$ ), heavy alcohol use (OR = 2.77;  $p = .079$ ), other drug use (OR = 2.77;  $p < .0001$ ), dysphoria/depression (OR = 2.16;  $p < .0001$ ), involvement in a serious fight (OR = 3.00;  $p < .001$ ), and carrying a weapon (OR = 2.16;  $p < .0001$ ).

Among non-ticket-gifted adolescents, ARPG versus LRG youth were more likely to report occasional or regular tobacco use (ORs = 1.80 and 2.34, respectively;  $p = .002$ ), marijuana use (OR = 1.45;  $p = .012$ ), other drug use (OR = 1.79;  $p = .034$ ), involvement in a serious fight (OR = 1.33;  $p < .0001$ ), and carrying a weapon (OR = 1.06;  $p < .0001$ ). No interactions were statistically significant, suggesting that the relationships between gambling-problem severity and health/functioning measures were similar in ticket-gifted and non-ticket-gifted groups (Table 4).

Among ticket-gifted adolescents, ARPG versus LRG youth were less likely to have an age at gambling onset of 15 years or older (OR = .38;  $p < .0001$ ) and more likely to have gambled online, at school, or at a casino (ORs = 3.08, 4.37, and 3.52, respectively;  $p < .0001$  for all), experienced gambling-related pressure and anxiety (ORs = 4.30 and 12.68, respectively;  $p < .0001$  for both), and gambled with peers (OR = 1.50;  $p = .0006$ ), family members (OR = 1.49;  $p = .0002$ ), other adults (OR = 2.20;  $p < .0001$ ), and strangers (OR = 5.27;  $p < .0001$ ) and alone (OR = 3.12;  $p < .0001$ ), and have an age at gambling onset of 14 years or younger (OR = .38;  $p < .0001$ ). Among non-ticket-gifted adolescents, ARPG versus LRG youth were more likely to have experienced gambling-related pressure and anxiety (pressure OR = 3.51;  $p < .0001$ ; anxiety OR = 16.95;  $p < .0001$ ) and have gambled at school (OR = 3.51;  $p < .$

0001), with family members (OR = 1.24;  $p < .0001$ ), friends (OR = 2.01;  $p < .0001$ ), other adults (OR = 2.08;  $p < .0005$ ), and strangers (OR = 3.19;  $p < .0001$ ) and alone (OR = 3.32;  $p < .0001$ ). A significant interaction effect (OR = .39;  $p = .0099$ ) was observed for age-at-gambling-onset of 15 years or older among the gift group: ARPG was associated with lower odds in the gift group, whereas there was no relationship in the nongift group. No other interactions were statistically significant, suggesting that the relationship between gambling-problem severity and gambling measures were similar in the gift and nongift groups (Table 5).

### Post-hoc analyses of problem/pathologic gambling

To examine further, we separated ARPG respondents ( $n = 687$ ) into ARG (62.6%;  $n = 430$ ) and PPG (37.4%;  $n = 257$ ) groups. The relationships with variables listed in Tables 4 and 5 were largely similar across gift and nongift groups with the exception of light smoking, which showed a significant interaction effect (OR = 5.41;  $p = .013$ ), indicating a stronger association with PPG in the lottery-ticket-gifted adolescents (OR = 2.41;  $p > .05$ ) than in the lottery-ticket-non-gifted adolescents (OR = .56;  $p > .05$ ).

## Discussion

To our knowledge, this is the first study to investigate in a large sample of adolescent gamblers who did and did not receive instant (scratch) lottery tickets as gifts (1) sociodemographic characteristics; (2) differences in gambling attitudes and behaviors; and (3) relationships between gambling-problem severity and health/functioning characteristics, risk behaviors, and gambling motivations and behaviors. Adolescents who received lottery tickets as gifts were more likely to report one or more inclusionary criteria for pathological gambling, buy lottery tickets for themselves and receive other types of lottery tickets, and report attitudes or display behaviors seemingly linked to greater gambling involvement. However, with the exception of age at gambling onset, the relationship between gambling-problem severity and health/functioning characteristics, risk behaviors, and gambling motivations and behaviors were largely similar irrespective of lottery gift receipt. Implications of the findings are described below.

### Sociodemographics

Previous studies indicate that scratch lottery tickets are the most popular type of lottery among youth, particularly those with a younger age at gambling onset [19]. In a study comparing youths from North America, Europe, and Oceania, problem versus nonproblem gamblers were more likely to start gambling at a younger age [20]. The current findings linking gift-receipt status to greater gambling-problem severity, along with earlier age at gambling onset, may hold important longitudinal implications if trajectories for gambling are similar to those for drinking, inasmuch as youth who begin drinking at younger ages have an increased risk for alcoholism later in life [21]. The current findings that adolescents who received scratch-ticket gifts were more likely to be Caucasian and live in two-parent or “other” households suggest that cultural and familial factors represent important considerations in youth lottery gambling prevention efforts.

### Gambling attitudes and perceptions

The gift-recipient group was more likely to endorse differences in perceived parental approval of gambling, with greater percentages of parental approval and lower percentages of disapproval. The extent to which these beliefs may be related to gift receipt (connoting approval) or may reflect other factors (e.g., parental gambling, other behaviors or comments promoting gambling) warrants additional investigation. A national survey of Canadian parents, with teens between the ages of 13 and 18, revealed that parents perceive adolescent



gambling to be relatively unimportant compared with other risky behaviors [22]. Adolescents' perception of their parents' approval may be indicative of behavior in which adults themselves engage. This pattern appears consistent with findings in other areas of addiction, e.g., that smokers are more likely to provide tobacco products to minors [23].

The less frequent acknowledgement by the gift-recipient group of the importance of having parents who do not gamble raises questions whether parental gambling may be more prevalent in this group. Parental gambling participation has been reported to additively predict early gambling in children [13], and females with a problem-gambling parent had earlier ages at gambling onset and greater financial troubles [24]. Moreover, children of parents with gambling problems experience more depressive feelings and conduct problems by mid-adolescence than do children of parents without gambling problems [25]. Together, findings suggest that parental gambling involvement may lead to negative outcomes for adolescents.

The gift-recipient group was less likely to acknowledge the importance of having nongambling peers or engaging in nongambling-related activities. Previous findings suggest a strong peer influence on gambling behaviors in adolescents [11]. The gift-recipient group was less likely to acknowledge the importance of learning about the potential harms of gambling, either from parents or from other family members, or being educated about such potential harms at school. Together, these data indicate a lesser likelihood of perceiving problem-gambling-prevention efforts as important, and such views should be considered in the development and implementation of youth-problem-gambling-prevention initiatives [26].

It may be beneficial to have gift-recipient groups suggest what strategies may work in preventing adolescent gambling, given that they frequently reported many current strategies as "not important." From a public policy standpoint, the implementation of effective youth-gambling-prevention strategies, and the education of adolescents and their parents of the negative outcomes of problematic gambling, could be particularly important. Such efforts involving both parents and children might help alter parental gambling attitudes and behaviors and youth perceptions of parental approval of gambling. Studies of adolescent smoking indicate that certain factors, such as concern for health and addiction, a positive self-image, and perceived self-confidence, influence adolescents' decisions about smoking [27]. Incorporating elements relating to these factors in educational and prevention approaches may be beneficial in youth-problem-gambling prevention.

### **Relationships with gambling-problem severity**

With the exception of age at gambling onset, our second hypothesis was largely not supported in that gambling-problem severity correlates were generally similar across the gift and nongift groups. Thus, whereas the receipt of scratch-ticket gifts may relate to gambling-problem severity and influence gambling attitudes and behaviors, including some particularly relevant to prevention strategies, the correlates of gambling-problem severity did not differ greatly in gift and nongift groups. However, the finding that ARPG was less likely than LRG to be associated with later age at gambling onset in the gift group is noteworthy and suggests that receiving instant lottery gambling tickets may promote the earlier engagement in gambling and development of problematic gambling, as reflected by reported earlier age at gambling onset and more frequent acknowledgement of ARPG, respectively. As other features linked to gambling-problem severity appear similar for the two groups, it might be difficult for adults (clinicians, school personnel) to identify how scratch-lottery-gift status may be influencing youth for whom they have responsibilities.

## Relationships with problem/pathologic gambling

Given that the ARPG group included both at-risk and PPG respondents and that prior studies have demonstrated differences between these groups [19,28], we explored the extent to which relationships with health, functioning, and gambling measures might differ across lottery-gift groups if the PPG group was separated from the ARG group. The finding of a significant interaction effect for light smoking indicating a stronger relationship in the gift group versus the nongift group begs multiple questions and suggests several possibilities. First, the stronger link between PPG and light smoking in the lottery-gift group raises the question whether lottery-ticket gifts prime specific youth for riskier engagement in experimenting with tobacco and more risky gambling. Second, it raises questions about whether products may be obtained at similar venues (e.g., tobacco and lottery tickets at convenience stores) or used in conjunction (e.g., smoking while gambling). Future studies should examine these possibilities.

## Prevention implications

Problem gambling represents an important public health issue. Although most efforts target adult pathological gambling, there is significant concern that adolescents and young adults have the highest prevalence estimates of problem and pathological gambling [26] and that problem gambling in adolescence may lead to pathological gambling in adulthood [29]. The Youth Gambling Risk Prevention Model [30] provides a basis for targeting gambling problems in adolescents who demonstrate differing levels of gambling involvement and may experience varying risks for the development of gambling-related problems. The primary, secondary, and tertiary methods of prevention proposed in this model warrant further testing.

The development of more stringent rules for not selling lottery tickets to minors and their enforcement appear very relevant to this model. A recent study in Montreal indicated that youths aged 15 to 17 were able to purchase lottery tickets without any form of identification. Moreover, youths under 18 years of age were also able to access casino gambling despite restrictions [22]. It is probable that similar cases may occur in the United States, with laws regarding legal ages for participation varying according to jurisdiction and data suggesting increased underage participation by youth as they approach the legal age [20]. Data regarding youth smoking appear helpful to consider with respect to youth gambling prevention. Despite public support and laws preventing sales of tobacco to minors [23,31–35], tobacco sales to minors have increased recently [34]. However, as tobacco becomes more difficult to purchase, youth may seek to obtain tobacco from social sources, including family members and older adults [35]. The extent to which such behaviors may extend to lottery products warrants consideration, particularly because these behaviors would augment the importance of discouraging adults from providing lottery tickets to minors.

Increasing the awareness of the negative health outcomes and risks associated with problem gambling may be beneficial to adolescents, their families, teachers, educators, and other professionals (e.g., pediatricians). International efforts (e.g., those involving dissemination of the message, “Lotteries are not child’s play; give responsibly this holiday season”) reflect a widespread effort to target youth lottery gambling and engage adults with respect to limiting youth access to lottery gambling through gifts [36]. In Connecticut, the “Lottery Is Not Child’s Play” initiative of the Connecticut Partnership for Responsible Gambling, promoted through the Connecticut Lottery website (<http://www.ctlottery.org/Partnership/partnership.htm>), explicitly states that lottery tickets are inappropriate gifts for minors and that adults should avoid involving underage children in lottery play and gambling. It is also important to examine the feasibility of enforcing statutes prohibiting gifting lottery tickets to

minors because there may be complications related to the enforcement and public support of such mandates.

### **Strengths, limitations, and future directions**

The current study has multiple strengths including a large sample assessed using inclusionary criteria for pathological gambling and questions used in other youth surveys. Nonetheless, there are limitations. First, the sample is not nationally representative, and the findings may not generalize uniformly. Second, owing to the cross-sectional design of the survey, the ability to examine the nature of observed associations is limited. For example, it cannot be determined whether receiving scratch-lottery gifts leads to specific attitudes, specific attitudes lead to receiving gifts, or other factors contribute to the observed relationship. Future studies might benefit from prospective designs. Third, several of the measurements, including those assessing depressive and aggressive features, used nondiagnostic and dichotomous measurements. Future studies using more precise measurements may be valuable in understanding the impact of lottery-scratch-ticket gifts, and they may benefit from including measurements of other “gambling gifts” (e.g., parents allowing children to borrow credit cards for online gambling). Fourth, some measurements (e.g., those assessing aggressive tendencies) use different timeframes. Although these questions are derived from the Youth Child Risk Behavior Survey (thus facilitating comparisons across studies), the differing timeframes may add complexity to understanding findings. Fifth, other questions queried perceptions, and it is not known the extent to which these perceptions are fully grounded (e.g., the extent to which youth know about parental attitudes or behaviors). Sixth, past-year receipt of gifted tickets was studied, given the interest in recent gambling behavior. Lifetime data were not assessed and may have provided additional insight. Seventh, the frequency but not quantity of lottery-ticket gifting was assessed. Assessment of lottery-ticket-gift quantities may have been informative. Eighth, inasmuch as youth problem gamblers are more likely to have parents who gamble [20], future studies might assess concurrently gambling behaviors and attitudes from youth and their parents. Ninth, because youth gambling participation may vary in states with different laws governing legal ages for gambling and permitting different forms of gambling, future studies should assess larger geographic regions (including multiple states) to examine the extent to which gambling behaviors and attitudes may vary accordingly.

The receipt of lottery-scratch-ticket gifts during childhood or adolescence is associated with problematic gambling features, early age at gambling onset, and permissive attitudes and pro-motivational behaviors toward gambling. Moreover, youth who have received instant lottery tickets as gifts appear less likely to believe that gambling prevention strategies are important. The extent to which receipt of instant-lottery-ticket gifts may promote gambling behaviors and the development of gambling problems warrants consideration, and strategies for education, prevention, and treatment should incorporate findings relating to receipt of gambling products by underage individuals.

### **Supplementary Material**

Refer to Web version on PubMed Central for supplementary material.

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### IMPLICATIONS AND CONTRIBUTION

Lottery-ticket-gift receipt by adolescent gamblers is associated with permissive attitudes towards gambling, early age of gambling onset, and differential associations between age-at-gambling-onset and problem-gambling severity. These findings suggest that gifting lottery tickets to youths may impact adolescent gambling attitudes and behaviors and that prevention efforts consider these relationships.

**Table 1**

Sociodemographic characteristics of the sample by lottery ticket gift status

Variable/category	Received scratch tickets as gift [n (%)]	Did not receive scratch tickets as gift [n (%)]	$\chi^2$ Statistics	
			$\chi^2$	<i>p</i>
Gender			.02	.8989
Male	631 (61.0)	582 (60.7)		
Female	404 (39.0)	377 (39.3)		
Race/ethnicity			140.12	<.0001
Caucasian				
Yes	876 (83.3)	578 (59.6)		
No	176 (16.7)	392 (40.4)		
African-American			76.23	<.0001
Yes	59 (5.6)	175 (18.0)		
No	993 (94.4)	795 (82.0)		
Asian			3.21	.0732
Yes	39 (3.7)	52 (5.4)		
No	1013 (96.3)	918 (94.6)		
Hispanic			17.20	<.0001
Yes	134 (13.2)	185 (20.3)		
No	879 (86.8)	728 (79.7)		
Other			34.07	<.0001
Yes	126 (12.0)	210 (21.7)		
No	926 (88.0)	760 (78.4)		
Grade			5.03	.1697
9	314 (30.0)	293 (30.3)		
10	260 (24.8)	271 (28.0)		
11	266 (25.4)	244 (25.2)		
12	207 (19.8)	159 (16.4)		
Family structure			11.00	.0041
One parent	217 (21.0)	259 (27.3)		
Two parents	741 (71.5)	627 (66.1)		
Other	78 (7.5)	63 (6.6)		
Current age			2.02	.3641
14	131 (15.7)	121 (16.8)		
15–17	566 (67.8)	500 (69.3)		
18+	138 (16.5)	101 (14.0)		

Values indicate sample size (n) with column percentage in parentheses.

**Table 2** $\chi^2$  analyses of gambling attitudes and behaviors by scratch ticket gift status

Variable/category	Received scratch tickets as gift [N (%)]	Did not receive scratch tickets as gift [N (%)]	$\chi^2$ Statistics	
			$\chi^2$	<i>p</i>
Age at gambling onset			16.9	.0007
8 years	156 (17.2)	85 (12.0)		
9–11 years	163 (17.9)	101 (14.3)		
12–14 years	332 (36.5)	273 (38.5)		
15 years	258 (28.4)	250 (35.3)		
Bought scratch ticket for self			221.53	<.0001
Yes	465 (44.5)	137 (14.1)		
No	580 (55.5)	833 (85.9)		
Bought other type of lottery ticket			100.06	<.0001
Yes	224 (21.7)	58 (6.1)		
No	809 (78.3)	901 (94.0)		
Received other lottery ticket			539.31	<.0001
Yes	552 (52.8)	52 (5.37)		
No	493 (47.2)	917 (94.6)		
Parent perception about gambling			82.17	<.0001
Disapprove	243 (27.4)	387 (47.6)		
Neither approve nor disapprove	507 (57.2)	366 (45.0)		
Approve	136 (15.4)	60 (7.38)		
Importance for preventing gambling problems in teens				
Checking identification for purchasing lottery tickets			7.29	.0069
Important	745 (76.2)	738 (81.3)		
Not important	233 (23.8)	170 (18.7)		
Hanging out with friends who don't gamble			19.11	<.0001
Important	632 (65.3)	672 (74.6)		
Not important	336 (34.7)	229 (25.4)		
Participating in activities that are fun and free of gambling			10.8	.0010
Important	735 (75.8)	738 (82.0)		
Not important	235 (24.2)	162 (18.0)		
Fear of losing valuable possessions, close friends, and relatives			2.93	.0872
Important	824 (84.8)	785 (87.5)		
Not important	148 (15.2)	112 (12.5)		
Advertisements that show the problems associated with gambling			5.81	.0159
Important	694 (71.6)	676 (76.5)		
Not important	276 (28.5)	208 (23.5)		
Not having access to internet gambling at home			3.30	.0695
Important	579 (59.8)	567 (63.9)		
Not important	390 (40.3)	321 (36.2)		
Parent/guardian strictness about gambling			8.86	.0029



Variable/category	Received scratch tickets as gift [N (%)]	Did not receive scratch tickets as gift [N (%)]	$\chi^2$ Statistics	
			$\chi^2$	<i>p</i>
Important	715 (73.8)	708 (79.6)		
Not important	254 (26.2)	181 (20.4)		
Warnings from adults in family			9.94	.0016
Important	713 (73.7)	706 (79.9)		
Not important	255 (26.3)	178 (20.1)		
Warnings from, or listening to, peers			10.26	.0014
Important	725 (74.9)	716 (81.1)		
Not important	243 (25.1)	167 (18.9)		
Having parents who don't gamble			18.01	<.0001
Important	688 (71.2)	708 (79.7)		
Not important	278 (28.8)	180 (20.3)		
Learning about the risks of gambling in school			16.52	<.0001
Important	664 (69.7)	683 (77.1)		
Not important	303 (31.3)	203 (22.9)		
Learning about the risks of gambling from parents			11.16	.0008
Important	725 (74.9)	723 (81.3)		
Not important	243 (25.1)	166 (18.7)		
Learning about the risks of gambling from peers			6.65	.0099
Important	697 (72.0)	685 (77.2)		
Not important	271 (28.0)	202 (22.8)		
Adults not involving kids in gambling			4.13	.0422
Important	741 (76.7)	714 (80.6)		
Not important	225 (23.3)	172 (19.4)		
Parent/guardian not permitting card games (for money) at home			9.67	.0019
Important	562 (58.1)	578 (65.1)		
Not important	406 (41.9)	310 (34.9)		
Family concern			.51	.4778
Yes	133 (13.9)	113 (12.8)		
No	821 (86.1)	769 (87.2)		

Values indicate sample size (n) with column percentage in parentheses.

**Table 3**  
Sociodemographic characteristics of the sample, by scratch ticket status and problem-gambling severity

Variable/category	Received scratch tickets as gift		Did not receive scratch tickets as gift		χ <sup>2</sup> Statistics	
	Low-risk gambling [n (%)]	At risk/problem gambling [n (%)]	Low-risk gambling [n (%)]	At risk/problem gambling [n (%)]	χ <sup>2</sup>	p
Gender					46.67	<.0001
Male	329 (50.9)	302 (77.6)	360 (53.6)	222 (77.4)		
Female	317 (49.1)	87 (22.4)	312 (46.4)	65 (22.7)		
Race/ethnicity						
Caucasian					8.01	.0046
Yes	565 (86.3)	311 (78.3)	425 (62.5)	153 (52.8)		
No	90 (13.7)	86 (21.7)	255 (37.5)	137 (47.2)		
African-American					9.26	.0023
Yes	18 (2.8)	41 (10.3)	106 (15.6)	69 (23.8)		
No	637 (97.3)	356 (89.7)	574 (84.4)	221 (76.2)		
Asian					0.10	.8877
Yes	18 (2.7)	21 (5.3)	36 (5.3)	16 (5.5)		
No	637 (97.3)	376 (94.7)	644 (24.7)	274 (94.4)		
Hispanic					3.31	.0691
Yes	70 (11.0)	64 (16.9)	120 (12.7)	65 (24)		
No	564 (89.0)	315 (83.1)	522 (81.3)	206 (76.8)		
Other					1.12	.2898
Yes	78 (11.9)	48 (12.1)	141 (20.7)	69 (23.8)		
No	577 (88.1)	349 (87.9)	539 (79.3)	221 (76.2)		
Grade					2.73	.4352
9	187 (28.6)	127 (32.2)	197 (29.1)	96 (33.1)		
10	162 (24.8)	98 (24.9)	194 (28.7)	77 (26.6)		
11	176 (27.0)	90 (22.8)	178 (26.3)	66 (22.8)		
12	128 (19.6)	79 (20.1)	108 (16.0)	51 (17.6)		
Family structure					2.45	.2938
One parent	143 (22.1)	74 (19)	186 (27.8)	73 (26)		

Variable/category	Received scratch tickets as gift		Did not receive scratch tickets as gift		$\chi^2$	<i>p</i>	$\chi^2$	<i>p</i>
	Low-risk gambling [n (%)]	At risk/problem gambling [n (%)]	Low-risk gambling [n (%)]	At risk/problem gambling [n (%)]				
Two parents	474 (73.3)	267 (62.6)	443 (66.3)	184 (65.4)				
Other	30 (4.64)	48 (12.3)	39 (5.84)	24 (8.5)				
Current age					.23	.8901	3.60	.1650
<14	81 (15.7)	50 (15.7)	89 (17.6)	32 (14.8)				
15-17	353 (68.3)	213 (66.9)	253 (69.9)	147 (67.7)				
18+	83 (16.1)	55 (17.3)	63 (12.5)	38 (17.5)				

Values indicate sample size (N) with column percentage in parentheses.

**Table 4**

Adjusted odds ratios for health and well-being measures

Variable/category	Gift instant lottery ticket (%)	No gift instant lottery ticket (%)	Interaction OR: gift versus. no gift
	At risk/problem/pathologic gamblers versus low-risk gamblers	At risk/problem/pathologic gamblers versus low-risk gamblers	At risk/problem/pathologic gamblers versus low-risk gamblers
Academic/extracurricular			
Any extracurricular activities	1.00 (.72–1.39)	1.27 (.87–1.85)	.87 (.54–1.40)
Grade average			
A and B	Reference	Reference	Reference
Mostly C	1.08 (.79–1.48)	1.22 (.87–1.73)	.89 (.57–1.39)
D or lower	2.02 (1.33–3.05)	1.23 (.79–1.93)	1.40 (.78–2.51)
Substance use			
Smoking, lifetime			
Never	Reference	Reference	Reference
Occasionally	1.44 (1.03–2.01)	1.80 (1.26–2.59)	.77 (.49–1.23)
Regularly	1.95 (1.35–2.84)	2.34 (1.48–3.69)	.99 (.57–1.73)
Marijuana, lifetime	1.79 (1.34–2.41)	1.45 (1.04–2.02)	1.19 (.78–1.82)
Alcohol, sip	.71 (.42–1.21)	1.59 (.95–2.66)	.50 (.25–1.01)
Alcohol, current			
Never regular	Reference	Reference	Reference
Light	1.19 (.73–1.94)	1.22 (.73–2.02)	1.15 (.59–2.25)
Moderate	1.40 (.87–2.24)	1.36 (.83–2.25)	1.15 (.59–2.21)
Heavy	1.90 (1.09–3.30)	2.00 (1.02–3.93)	1.16 (.51–2.63)
Other drug, lifetime	2.77 (1.80–4.25)	1.79 (1.05–3.05)	1.76 (.92–3.35)
Caffeine use			
None	Reference	Reference	Reference
1–2 per day	.85 (.57–1.27)	.71 (.47–1.08)	1.11 (.64–1.91)
3+ per day	1.28 (.84–1.94)	1.18 (.76–1.84)	.96 (.54–1.71)
Mood			
Dysphoria/depression	2.16 (1.51–3.09)	1.74 (1.16–2.60)	.98 (.60–1.61)
Aggression			
Serious fights	3.00 (1.92–4.69)	2.00 (1.19–3.38)	1.33 (.69–2.56)
Carry weapon	2.16 (1.58–2.94)	2.07 (1.46–2.93)	1.06 (.67–1.67)
Weight			
Normal	Reference	Reference	Reference
Underweight	.98 (.60–1.60)	1.20 (.67–2.16)	.85 (.41–1.77)
Overweight	.85 (.57–1.27)	1.54 (1.00–2.36)	.51 (.29–.89)
Obese	.98 (.54–1.78)	1.63 (.91–2.92)	.54 (.25–1.20)

Values indicate odds ratios with 95% confidence intervals in parentheses.

Table 5

Adjusted odds ratios for gambling measures

Variable/category	Gift scratch tickets (%)	No gift scratch tickets (%)	Interaction OR: gift versus no gift
	At risk/problem/pathological gamblers versus low-risk gamblers	At risk/problem/pathological gamblers versus low-risk gamblers	At risk/problem/pathological gamblers versus low-risk gamblers
Gambling type			
Strategic	5.99 (1.71–21.0)	2.81 (1.13–6.98)	2.43 (.55–10.70)
Machine	2.63 (1.95–3.55)	1.78 (1.30–2.44)	1.47 (.96–2.25)
Gambling location			
Online	3.08 (2.24–4.23)	2.09 (1.36–3.21)	1.51 (.90–2.52)
School gambling	4.37 (3.20–5.97)	3.51 (2.50–4.94)	1.30 (.83–2.04)
Casino	3.52 (2.31–5.37)	4.29 (2.25–8.15)	1.00 (.48–2.09)
Triggers for gambling			
Pressure	4.30 (2.59–7.13)	3.51 (2.07–5.96)	1.22 (.60–2.46)
Anxiety	12.68 (5.67–28.40)	16.94 (5.75–49.94)	.68 (.18–2.52)
Reasons why gamble			
Excitement	2.75 (1.90–3.98)	2.82 (2.00–3.98)	1.04 (.64–1.69)
Financial reasons	3.45 (2.51–4.73)	3.06 (2.21–4.22)	1.18 (.76–1.82)
Escape	2.45 (1.83–3.28)	2.88 (2.05–4.04)	.94 (.61–1.43)
Social reasons	2.04 (1.54–2.71)	1.64 (1.18–2.29)	1.22 (.81–1.86)
People gamble with			
Family	1.49 (1.12–1.97)	1.24 (.91–1.70)	1.19 (.80–1.78)
Friends	1.50 (1.06–2.13)	2.01 (1.41–2.88)	.73 (.45–1.17)
Other adults	2.20 (1.64–2.96)	2.08 (1.42–3.04)	1.09 (.69–1.73)
Strangers	5.27 (3.22–8.61)	3.19 (1.63–6.23)	1.78 (.80–3.95)
Alone	3.12 (1.94–5.02)	3.32 (1.88–5.84)	1.09 (.54–2.21)
Time spent gambling			
1 hour or less	Reference	Reference	Reference
2+ hours/week	5.44 (3.67–8.07)	4.15 (2.49–6.90)	1.30 (.70–2.44)
Age at onset of gambling			
8 years old	Reference	Reference	Reference
9–11 years old	.80 (.49–1.30)	1.20 (.63–2.31)	.69 (.31–1.52)
12–14 years old	.72 (.47–1.11)	.74 (.43–1.30)	.93 (.47–1.85)
15 years old	.38 (.23–.61)	.91 (.51–1.62)	.39 (.19–.80)

Values indicate odds ratios with 95% confidence intervals in parentheses.