Health/functioning characteristics, gambling behaviors and gambling-related motivations in adolescents stratified by gambling problem severity: Findings from a high-school survey

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Abstract

In adults, different levels of gambling problem severity are differentially associated with measures of health and general functioning, gambling behaviors and gambling-related motivations. Here we present data from a survey of 2,484 Connecticut high school students, and investigate the data stratifying by gambling problem severity based on DSM-IV criteria for pathological gambling. Problem/pathological gambling was associated with a range of negative functions; e.g., poor academic performance, substance use, dysphoria/depression, and aggression. These findings suggest a need for improved interventions related to adolescent gambling and a need for additional research into the relationship (e.g., mediating factors) between gambling and risk and protective behaviors.

Keywords

gambling; adolescence; risk behaviors; substance use

Introduction

As with other impulsive behaviors (e.g. alcohol use), non-pathological levels of gambling are observed in the majority of the adult population[1]. Previous studies in adults have found marked differences in substance use, general health measures and gambling behaviors across different levels of gambling problem severity (e.g. non-gamblers, at-risk gamblers, problem/

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pathological gamblers)[2–4]. Despite the comparatively increased prevalence of gambling in adolescence[5–7], relatively little is known about the health/functioning characteristics and gambling behaviors associated with different levels of gambling problem severity in adolescence.

In adults, both problem and pathological gambling (PG) are associated with psychiatric disorders (e.g., substance use disorders (SUDs), mood disorders), medical disorders (e.g., obesity), increased likelihood of arrest/incarceration, suicide and other negative measures of functioning[1–4]. Associations between recreational gambling and some comorbidities observed in PG (e.g. obesity, nicotine dependence, alcohol abuse/dependence) have been reported[2,3]. However, these associations are typically less severe than those observed in PG, suggesting there may be an additive relationship between greater levels of gambling engagement and increased vulnerability to associated risk factors (e.g., SUDs). Given the high prevalence in the general population of recreational gambling, findings of associations between negative functioning measures and gambling even at recreational levels suggest that further research across different levels of gambling problem severity may have broad public health implications.

Age-related differences in the characteristics of recreational gamblers have been reported[2,8]. Adults with problem/pathological gambling typically report initial onset of gambling behaviors prior to adulthood, and an onset of gambling behaviors prior to adulthood is associated with an increased prevalence of comorbid SUDs in adulthood[9,10]. Thus, gambling during pre-adult developmental epochs like adolescence may have a significant impact on adult functioning.

Significant differences in motivations to gamble have been observed across gambling and age groups[8]. Different motivations to gamble are also associated with different gambling and substance use behaviors in recreational gamblers. For example, adult recreational gamblers reporting excitement as a motivation for gambling are more likely to report engagement in multiple types of gambling, a higher frequency of gambling, substance abuse/dependence, alcohol use and abuse/dependence and incarceration[11].

As compared to studies of adults, relatively fewer investigations have examined the health associations and gambling-related associations with subsyndromal levels of gambling among adolescents. In adolescents, problem/pathological gambling is associated with a similar range of psychiatric disorders (e.g. SUDs, mood disorders) and functioning impairments (e.g. impaired academic performance, theft) as is observed in the adult problem/pathological population[12–15]. Despite the high prevalence rates of adolescent recreational and problem/pathological gambling[5–7], the relationship between different levels of gambling problem severity, health/functioning measures and gambling behaviors/motivations in adolescence has received relatively little research attention. Such research has important implications not only for adolescent treatment interventions, but also for understanding of the course of the disorder of PG within the adult population.

Following the expansion of legalized gambling in the United States during the 1970s, 1980s and 1990s, studies of both adolescent and adult gambling have focused on the impact of environmental factors such as casino proximity and the establishment of state lotteries (e.g. Gerstein et al.[5]; Winters et al.[16]). Such research has demonstrated significant interactions between gambling behaviors and changes to the 'gambling climate' – e.g. a positive association between casino proximity and prevalence of problem/pathological gambling[5]. The extent to which other environmental factors (e.g. availability of internet gambling) additionally influence gambling behaviors in adolescence and adulthood is less well

understood, and further research is needed to assess the potential influence of such factors with respect to different levels of gambling problem severity.

There have been two recently published studies investigating adolescent risk behaviors stratifying across different levels of gambling problem severity[14, 15]. Ellenbogen and colleagues[14] compared self-report data from five Canadian studies of children and adolescents between the ages of 12 and 18 years (n = 7,819). Findings from this study are largely consistent with findings from adult studies, with problem/pathological gamblers more likely to report substance use, depression and vocational (i.e. poor academic performance) impairments when compared to social gamblers. Contrary to findings from adult studies, no significant differences in types of gambling were observed across the three gambling groups[14]. Jackson and colleagues[15] compared self-report data assessing a range of health/functioning and gambling variables from non-gambling and low-severity gambling Australian eighth-graders (mean age = 14 years; n = 2,788). In general, low-severity gambling was associated with an increased likelihood of academic impairments (i.e. school disciplinary action), substance use (i.e. cigarette smoking, marijuana, alcohol) and aggression (i.e. physical fights; carrying a weapon; purposeful damage of public/private property; theft)[15].

The findings from Ellenbogen et al.[14] and Jackson et al.[15] highlight the importance of studying gambling in adolescence, and demonstrate the utility of assessing adolescent risk factors across different levels of gambling problem severity. Findings from these studies are nonetheless limited by several factors. The study conducted by Jackson and colleagues included a narrow age range and did not distinguish between different levels of gambling problem severity based on DSM-IV criteria for PG. Instead, gambling groups were defined based on the number of different types of gambling participants had engaged in during the previous year[15]. The gambling groups included in Ellenbogen and colleagues[14] were defined using only 9 of the 10 DSM-IV criteria for PG (repeated, unsuccessful attempts to stop were not included)[17]. Ellenbogen and colleagues additionally excluded participants who had never gambled, preventing comparisons between recreational and non-gamblers[14]. Additionally, studies in Canada and Australia might generate different findings from those conducted in the United States due to geographic variation in multiple domains including gambling-related attitudes and availabilities of different forms of gambling. Further research comparing health/functioning and gambling behaviors across non-gamblers, low-risk gamblers, at-risk gamblers and problem/pathological gamblers is needed to identify factors associated with different levels of gambling problem severity in specific groups of adolescents.

The current investigation

Here we present novel data from a survey of 2,484 adolescents from multiple high schools in Connecticut. Based on DSM-IV criteria for PG, we divided participants into four groups (non-gamblers, low-risk gamblers, at-risk gamblers and problem/pathological gamblers) and compared them on a range of demographic, health/functioning and gambling-related measures. In comparison to non-gamblers, we hypothesized that at-risk and problem/pathological gamblers would have (1) poorer academic performance (e.g., more Ds and Fs); (2) greater frequencies of substance use; (3) increased frequencies of past-year dysphoria/depression; (4) increased frequencies of aggressive behaviors (e.g., physical fights, carrying a weapon); and (5) greater frequencies of obesity. We additionally hypothesized that, among gamblers, at-risk gambling and problem/pathological gambling (in comparison to low-risk gambling) would each be associated with more severe gambling behaviors and differences in gambling motivations.

Methods

Recruitment and sample characteristics

Recruitment and sample characteristics have been described previously[18]. All public 4-year and non-vocational or special education high schools in the state of Connecticut were invited to participate in this study via letters of invitation and follow-up calls to the school principals during 2006–2007. As an incentive for participation, schools were offered follow-up reports detailing the frequencies of risk behaviors included in the survey within their student body. Following initial recruitment procedures, not all geographic regions of the state were sufficiently represented, and further targeted recruitment was conducted to ensure adequate representation of under-represented regions within the sample. Among schools interested in participating, permission was additionally obtained from school boards and/or superintendents, when necessary.

The final survey sample included schools from all geographical state regions of Connecticut, as well as schools from each of the three tiers of the state's district reference groups (DRGs), for a total sample size of 4,523 adolescents. DRGs are based on the socioeconomic status of families within school districts, and all three tiers were included to ensure adequate socioeconomic representation within the study sample. While this is not a random sample of high school students in Connecticut, sample demographics were consistent with those reported in the 2000 Census of Connecticut residents ages 14–18[18, 19].

Within each school, the survey was administered on a single day by a member of the research team who explained the survey and answered questions from students. All students were reminded that participation was voluntary and that all answers were confidential and anonymous. The refusal rate for participation was less than 1%. Further details of study recruitment, sample characteristics and consent procedures are described elsewhere[18].

Survey characteristics

The survey was developed in order to assess multiple risk behaviors in Connecticut high school adolescents. The final survey consisted of 154 questions assessing a broad range of demographic characteristics, health/functioning measures, substance use and other risk behaviors and included several previously established measures (e.g., the Massachusetts Gambling Screen; MAGS[20]). Although other items were derived from surveys of adolescent risk behaviors (e.g., the Youth Child Risk Behavior Survey[21]), there exist incomplete psychometric information on aspects of the survey.

Demographic variables

Overall survey findings for the demographic variables age, gender, race/ethnicity and school grade (e.g. 9th) have been published previously[18].

In order to assess family structure participants were asked the question, 'what parent/legal guardian do you live with?'. Responses were coded into one of three distinct categories: One-parent, Two-parent ('Two parents (include step-parents)') and Other ('Foster family,' 'Grandparents,' 'Other relatives,' 'Other'). Responses to height and weight questions were used to calculate body mass indices (BMIs), which were then divided into one of four weight categories: Underweight (BMI ≤ 18.5), Normal Weight (BMI = 18.6- 24.9), Overweight (BMI = 25–29.9) and Obese (BMI ≥ 30).

Health/functioning variables

Academic and extracurricular—Academic performance was assessed using the question, 'What is your grade average?'. Engagement in extracurricular activities was

dichotomously coded yes/no, with a 'yes' response defined as endorsement of one or more of the activities listed ('community service/volunteer work,' 'team sports,' 'school clubs,' 'church activities,' 'paid part-time job').

Substance use behaviors—In order to assess lifetime cigarette smoking participants were asked the question, 'Have you ever smoked a cigarette?'. Responses were coded into one of three categories: Never ('Never'), Occasionally ('Once or twice,' 'Occasionally but not regularly'), Regularly ('Regularly in the past,' 'Regularly now'). Lifetime marijuana, alcohol and other drug use were all assessed using single survey items ('Have you ever smoked marijuana/ had a sip of alcohol/used designer or other drugs, such as Ecstasy, GHB, Special K, or cocaine?') and coded dichotomously yes/no, with a 'no' response defined as a 'never' response. Current alcohol use was assessed using the question, 'During the past 30 days, on how many days did you have at least one whole drink of alcohol?'. Responses were coded into one of four categories, as previously reported[18]: Never Regular (1–5 days), Light (6–9 days), Moderate (10–19 days) and Heavy (20–30 days). Caffeine use was assessed using the question, 'On average, how many servings of caffeine drinks do you drink a day? (A serving is 1 small cup of coffee or latte, 1 shot of espresso, 1 Red Bull or 2 cans of soda like Coke or Pepsi. Medium coffee is 2 servings, large is 3 servings)'. Responses were coded into one of three categories: None ('I don't drink caffeine drinks'), one to two drinks per day and three or more drinks per day.

Mood—Past-year dysphoria/depression was assessed using the question, 'During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing some usual activities?'.

Aggression—Carrying a weapon was assessed using the question, 'During the past 30 days, on how many days did you carry a weapon, such as a gun, knife, or club?' and coded dichotomously yes/no. Engagement in serious fights was assessed using the question, 'During the past 12 months, how many times were you in a physical fight in which you were injured and had to be treated by a doctor or nurse?' and coded dichotomously yes/no.

Gambling variables

In order to assess types of gambling (e.g. lottery/scratch card; dice/craps; machine gambling; placing bets with a bookie) and gambling locations (e.g. internet; casino; on school grounds) participants were asked to classify the frequency of their engagement in different types of gambling behaviors over the past 12 months as 'never,' 'less than monthly,' 'monthly,' 'weekly' or 'daily.'

Types of gambling—Different gambling behaviors were stratified into one of three categories: strategic gambling (i.e., "games of skill"), non-strategic gambling (i.e., "games of chance") and machine gambling. Engagement in strategic gambling was scored positively for acknowledgement of a positive response to any of the following items: 'Played cards (not in a casino),' 'Placed a bet with a bookie,' 'Bet on video or arcade games,' 'Bet on dice (craps) outside of a casino,' 'Bet on pool or other games of skill.' Engagement in non-strategic gambling was scored positively for acknowledgement of a positive response to any of the following items: 'Bought instant lottery or scratch tickets for yourself,' 'Bought other lottery tickets (for example, Power Ball) for yourself,' 'Received instant lottery or scratch tickets as a gift,' 'Received other lottery tickets as a gift,' 'Played bingo at a church, synagogue, or other public place.' Engagement in machine gambling was defined as a yes response to 'Played slot machines, poker machines, or other gambling machines.'

Gambling locations—On-line gambling, casino gambling and gambling on school grounds were scored dichotomously yes/no with a 'no' defined as a 'never' response to 'Placed bets on the internet,' 'Gambled at a casino' and 'Gambled on school grounds,' respectively.

Gambling motivations—In order to assess motivations for gambling, participants were the question, 'What are the reasons that you gamble? Check ALL that apply'. The 12 possible response items were divided into one of four categories: Gambling for Excitement/ Fun ('Fun and entertainment,' 'Excitement,' 'It's a challenge,' 'It's a hobby'); Gambling for Financial Reasons ('To win money,' 'To support good causes'); Gambling for Escape/to Relieve Dysphoria ('To calm down,' 'To feel good about myself (e.g. feel like a winner),' 'As a distraction from my problems,' 'Boredom'); and Gambling for Social Reasons ('To socialize with friends,' 'Peer pressure (e.g. to fit in)'). Each response category was dichotomously scored yes/no, with a 'yes' response defined as endorsement of any of the category items.

Gambling urges—In order to assess gambling urges, participants were asked the questions 'Do you ever feel pressure to gamble when you do not gamble?' and 'In the past year have you ever experienced a growing tension or anxiety that can only be relieved by gambling?'.

Gambling partners—In order to assess types of gambling partners, participants were asked the question, 'When you gamble, with whom do you usually gamble? Check ALL that apply'. Endorsement of either of the response items 'Parents' and 'Other adults' were coded as a 'yes' response to the category 'Adults.' Endorsement of either of the response items 'Parents,' 'With family' and 'Brothers and sisters' were coded as a 'yes' response to the category 'Family'. Response categories 'Alone', 'Friends' and 'Strangers' were each defined by their corresponding single response items.

Gambling onset and duration—In order to assess time spent gambling and age-of-onset, participants were asked the questions 'In an average week, about how many hours do you spend gambling or placing bets?' and 'At what age did you first start to gamble or place bets?', respectively.

Gambling groups

Participants were divided into one of four gambling groups: non-gamblers, low-risk gamblers, at-risk gamblers, problem/pathological gamblers. Non-gamblers were defined as participants who reported not having gambled in the previous 12 months. All other gambling groups were determined based on DSM-IV criteria[17], as assessed using items from the Massachusetts Gambling Screen (MAGS)[20], which directly correspond to each of the DSM-IV criteria for PG (e.g., 'During the past 12 months, have you gambled increasingly larger amounts of money to experience your desired level of gambling excitement?') and were included in the survey. The MAGS is a 31-item self-report measure of gambling behaviors, and its reliability and internal consistency has been demonstrated in adult populations[22] *reviewed in* [23]. However, items relating to the DSM-IV criteria for pathological gambling have received less empirical testing amongst adolescents[20]. When more than a single MAGS item corresponded to the same DSM-IV criterion (e.g. tolerance), a single point was awarded for endorsing either item or for endorsing both items, in order to ensure that each criterion received equal weighting. Only those participants who responded to all 12 of the MAGS items directly corresponding to DSM-IV criteria were stratified into gambling groups. Participants who reported past-year gambling but did not meet any DSM-IV criteria were classified as low-risk gamblers. Participants endorsing one to two DSM-IV criteria

were classified as at-risk gamblers and those participants endorsing three or more criteria were classified as problem/pathological gamblers. This stratification follows closely prior studies of gambling behaviors in adults (e.g. Desai et al.[2]; Shaffer et al.[24],Desai et al.[25]) Among the 4,523 participants surveyed, 2,484 (54.9%) respondents had sufficient data to be classified into the gambling groups.

Data Analysis

Data were double-entered from the paper surveys into an electronic database. Random spot-checks of completed surveys and data cleaning procedures were performed to ensure that data were accurate and not out of range. All statistical analyses were conducted using SAS (Cary, NC).

Data analyses proceeded in several steps. First, unadjusted differences between the four gambling groups were examined using Pearson chi-square tests. All comparison tests were two-tailed. These were not adjusted for multiple comparisons since the unadjusted analyses were utilized largely for descriptive purposes. Second, regression models were fit separately for every health/functioning and risk factor presented in the tables, adjusted for age, race, gender and household structure. Logistic regression models were used to examine associations with binary dependent variables, and multinomial logistic regression models were used for dependent variables with more than two levels. Separate models were fit for each health variable due to high correlations among the dependent variables. Odds ratios were calculated for each gambling group in comparison to low-risk gamblers, with corresponding Wald Chi-square tests to determine whether associations were significant.

Finally, among the sub-sample of students reporting gambling, patterns and motivations for gambling were compared among the three gambling groups, using Chi-square tests for unadjusted comparisons and logistic regression models adjusting for age, race, gender and household structure. Odds ratios were calculated comparing at-risk to low-risk gamblers, problem/pathological to low-risk gamblers, and problem/pathological to at-risk gamblers. Due to the number of post-hoc comparisons, these analyses were corrected for multiple comparisons.

Results

Prevalence estimates and demographic characteristics

Among the 2,484 respondents providing data for the current analyses, 18.3% were classified as non-gamblers, 53.9% were classified as low-risk gamblers, 17.4% were classified as at-risk gamblers and 10.4% were classified as problem/pathological gamblers. Among participants classified as problem/pathological gamblers, 52.3% met five or more DSM-IV criteria for PG.

The results of chi-square analyses are shown in Table 1. Amongst the four gambling groups, the problem/pathological gambler group included the highest frequencies of African-American, Asian, Other and Hispanic respondents, and the lowest frequencies of Caucasian respondents. Ninth graders were the most prevalent grade group across low-risk, at-risk and problem/pathological gambling groups. In contrast, 11th graders were the most prevalent in the non-gambling group. The problem/pathological group included the lowest frequency of respondents from a two-parent family and the highest frequency of respondents who classified their family structure as 'other.' All three gambling groups included more boys than girls, and this was most pronounced in the at-risk and problem/pathological gambling groups.

Health/Functioning Measures

Results of logistic regression models examining the relationships between gambling groups and health/functioning characteristics are presented in Table 2.

Academic and extracurricular—In comparison to low-risk gamblers, non-gamblers were less likely to report participation in extracurricular activities (OR = 0.69, p = 0.005), mostly B's (OR = 0.67, p = 0.012) and mostly B's and C's (OR = 0.67, p = 0.018). In comparison to low-risk gamblers, both at-risk and problem/pathological gamblers were more likely to report receiving D's or lower (OR = 2.46, p = 0.026; OR = 7.56, p <.0001). In comparison to at-risk gamblers, problem/pathological gamblers were more likely to report receiving D's or lower (OR = 5.60, p = <.0001).

Substance use behaviors—In comparison to low-risk gamblers, non-gamblers were less likely to report occasional or regular cigarette smoking (OR = 0.54, p < .0001; OR = 0.52, p = 0.001), any lifetime marijuana use (OR = 0.56, p <.0001), any lifetime alcohol use (OR = 0.24, p <.0001), current moderate or heavy alcohol use (OR = 0.59, p = 0.023; OR = 0.32, p = 0.003), lifetime other drug use (OR = 0.50, p = 0.011) and consuming one or more caffeinated drinks per day (OR = 0.81, p = 0.001; OR = 0.53, p < .0001).

At-risk gamblers were more likely than low-risk gamblers to report occasional cigarette smoking (OR = 1.51, p = 0.003). Problem/pathological gamblers were more likely than low-risk gamblers to report occasional and regular cigarette smoking (OR = 2.00, p = 0.000; OR = 4.21, p < .0001), any lifetime marijuana use (OR = 3.31, p < .0001), moderate or heavy current alcohol use (OR = 2.22, p = 0.005; OR = 5.03, p < .0001), other drug use (OR = 5.81, p < .0001) and consuming three or more caffeinated drinks per day (OR = 2.37, p = 0.032). In comparison to at-risk gamblers, problem/pathological gamblers were more likely to report occasional and regular cigarette smoking (OR = 1.77, p = 0.002; OR = 3.83; p <.0001), lifetime marijuana use (OR = 3.12, p <.0001), moderate and heavy current alcohol use (OR = 2.03, p = 0.011; OR = 4.54, p<.0001), other drug use (OR = 5.68; p <.0001) and consuming three or more caffeinated drinks per day (OR = 1.51, p = 0.043). In comparison to at-risk gamblers, problem/pathological gamblers were less likely to report consuming one to two caffeinated drinks per day (OR = 0.61, p = 0.019).

Mood—Problem/pathological gamblers were more likely to report past-year dysphoria/depression in comparison to both low- and at-risk gamblers (OR = 4.15, p < .0001; OR = 3.95, p <.0001).

Aggression—In comparison to low-risk gamblers, non-gamblers were less likely to report serious fights (OR = 0.50, p = 0.03) and carrying a weapon to school (OR = 0.47, p < .0001). In comparison to low-risk gamblers, at-risk gamblers were more likely to report carrying a weapon to school (OR = 1.69, p = 0.000). In comparison to both low- and at-risk gamblers, problem/pathological gamblers were more likely to report engagement in serious fights (OR = 6.48, p <.0001; OR = 6.45, p <.0001) and carrying a weapon to school (OR = 3.40, p < .0001; OR = 2.89, p <.0001).

Weight—No differences in BMI were observed across gambling groups.

Gambling behaviors/motivations

The results of multiple logistic regression models examining the relationship between different levels of gambling problem severity and gambling behaviors/motivations are provided in Table 3.

Gambling types—In comparison to low-risk gamblers, at-risk gamblers were more likely to report engagement in strategic (OR = 7.05, p = 0.001) and machine gambling (OR = 1.74, p < .0001), and less likely to report engagement in non-strategic gambling (OR = 0.39, p = 0.005). Problem/pathological gamblers were more likely than both low- and at-risk gamblers to report engagement in machine gambling (OR = 4.27, p < .0001; OR = 2.46, p < .0001). Problem/pathological gamblers were less likely to report engagement in non-strategic gambling when compared to low-risk gamblers (OR = 0.83, p < .0001). Problem/pathological gamblers were more likely to report engagement in non-strategic gambling when compared to at-risk gamblers (OR = 1.56, p = 0.034).

Gambling locations—In comparison to low-risk gamblers, both at-risk and problem/pathological gamblers were more likely to report online gambling, gambling on school grounds and casino gambling. Problem/pathological gamblers were more likely than at-risk gamblers to report online (OR = 3.39, p < .0001), school grounds (OR = 1.88, p = .001) and casino (OR = 5.54, p < .0001) gambling.

Gambling motivations—In comparison to low-risk gamblers, both at-risk and problem/pathological gamblers were more likely to report excitement (OR = 3.00, p < .0001; OR = 2.78, p < .0001), financial (OR = 3.03, p <.0001; OR = 4.14, p < .0001), escape (OR = 2.15, p < .0001; OR = 4.25, p < .0001) and social (OR = 1.73, p < .0001; OR = 2.41, p < .0001) motivations for gambling. In comparison to at-risk gamblers, problem/pathological gamblers were more likely to report gambling for escape (OR = 1.98, p < .0001).

Gambling urges—In comparison to low-risk gamblers, at-risk and problem/pathological gamblers were more likely to report feeling pressure to gamble (OR = 2.02, p = .002; OR = 8.01, p < .0001) and feelings of anxiety prior to gambling that were relieved by gambling (OR = 2.85, p = .014; OR = 43.71, p < .0001). In comparison to at-risk gamblers, problem/pathological gamblers were also more likely to report feelings of pressure (OR = 3.97, p < .0001) and anxiety (OR = 15.34, p < .0001).

Gambling partners—In comparison to low-risk gamblers, at-risk and problem/pathological gamblers were more likely to report gambling with adults, gambling with strangers and gambling alone. When compared to at-risk gamblers, problem/pathological gamblers were less likely to report gambling with friends (OR = 0.47, p < .0001) and more likely to report gambling with strangers (OR = 3.90, p < .0001) and gambling alone (OR = 3.44, p < .0001).

Gambling onset and duration—In comparison to low-risk gamblers, both at-risk and problem/pathological gamblers were more likely to report more than 1 hour spent gambling per week (OR = 3.00, p < .0001; OR = 9.43, p < .0001), and problem/pathological gamblers were additionally more likely than at-risk gamblers to report gambling for more than 1 hour per week (OR = 3.14, p < .0001).

Problem/pathological gamblers were more likely than low-risk gamblers to report an age of gambling onset ≤ 8 years (OR = 2.81, p = 0.0001) or between 9 and 11 years (OR = 2.23, p = 0.002). In comparison to at-risk gamblers, problem/pathological gamblers were more likely to report an age of gambling onset ≤ 8 years (OR = 2.38, p = 0.005).

Discussion

Summary

Here we present novel data from a sample of 2,484 Connecticut high school students stratified by gambling behaviors, and assessed on a wide range of health/functioning and risk-related behaviors. To our knowledge, this is the first study in the United States of adolescent characteristics stratifying for different levels of gambling problem severity based on DSM-IV criteria for pathological gambling. Problem/pathological gambling was associated with a range of negative functions (e.g., substance use), as well as with a greater severity of gambling behaviors and differences in gambling motivations and cognitions (e.g., subjective emotional states).

Demographic characteristics

The problem/pathological gambling group included the highest frequencies of all race/ethnicity categories, with the exception of Caucasian. As such, future studies of adolescent gambling should explore more explicitly associations between different racial/ethnic factors and the development of different gambling behaviors in adolescence.

Whereas ninth graders were the most prevalent grade group across all gambling groups with the exception on the non-gambling group, 11th graders were the most prevalent in the non-gambling group. These findings may be interpreted several ways. For example, it is possible that younger adolescents might be more likely to report gambling behaviors in order to appear more mature, however this hypothesis is not supported by previous studies demonstrating elevated rates of gambling behaviors in younger populations[26]. It is additionally possible that older students who gamble may have been less likely to complete the survey. Further research using longitudinal designs is needed to explore the development of gambling behaviors across adolescence.

Health/functioning measures

Consistent with our primary hypotheses, poorer academic performance (e.g., more Ds and Fs), greater frequencies of substance use, increased frequencies of past-year dysphoria/depression and increased frequencies of aggressive behaviors (e.g., physical fights, carrying a weapon) and were observed among at-risk and problem/pathological gamblers. Non-gambling was generally associated with better functioning and problem/pathological gambling was associated with worse functioning across a broad range of health/functioning measures when compared to low-risk gambling. In general, similar patterns of functioning were observed between low-risk and at-risk gamblers.

Academic and extracurricular—Consistent with our primary hypothesis, poorer academic performance was observed among at-risk and problem/pathological gamblers. Differences in academic performance were most markedly pronounced at the extreme ends of the spectrum, with A's most frequently acknowledged by non-gamblers and D's or lower most frequently acknowledged by problem/pathological gamblers. Whereas both at-risk and problem/pathological gamblers were more likely to report receiving D's or lower when compared to non-gamblers – and problem/pathological gamblers were more likely than at-risk gamblers to report receiving D's or lower - at-risk gamblers showed little difference in comparison to low-risk gamblers, contrary to our hypothesis. These findings are consistent with one previous report of an association between impaired academic performance and problem/pathological gambling in adolescence[14], and additionally suggest that relatively modest increases in gambling problem severity (e.g. from low-risk to at-risk) may not significantly impact academic performance.

In contrast to previous findings of a positive association between participation in athletics and severity of gambling problems among college students[27], both at-risk and problem/ pathological gamblers were more likely to report participation in extracurricular activities. Previous research suggests a complex relationship between engagement in extracurricular activities and adolescent risk behaviors (e.g., positive correlations with sexual activity[28]; negative correlations with substance use[29]), and further research is needed to further explore the relationship between different types of extracurricular activities (e.g. part-time employment, school clubs, athletics) and risk behaviors in adolescence.

Substance use behaviors—Consistent with our second hypothesis, increased frequencies of substance use were observed among at-risk and problem/pathological gamblers. Moreover, these elevated frequencies were also observed among low-risk gamblers. In comparison to both low-risk and at-risk gambling, problem/pathological gambling was associated with an increased likelihood of a wide range of substance use behaviors, including cigarette smoking, marijuana and designer/other drug use, moderate to heavy alcohol use and consumption of three or more caffeinated drinks per day. In contrast, non-gambling was associated with a decreased likelihood of cigarette smoking, lifetime marijuana, alcohol and designer/other drug use, current moderate to heavy alcohol use and current caffeine use. Findings of increased substance use are consistent with previous studies of high school populations and with data from the Gambling Impact and Behaviors Study (GIBS)[5, 12–14]. These findings additionally suggest that substance use behaviors may increase in tandem with gambling problem severity amongst adolescents. This interpretation is consistent with the positive association between an age of gambling onset prior to18 years of age and increased levels of comorbid substance use in adult gamblers[10].

To our knowledge, this is the first study to compare caffeine consumption across adolescent gambling groups. Caffeine has been demonstrated to improve executive function and reduce impulsivity in children with attention deficit hyperactivity disorder (ADHD)[30], and a positive association between gambling problem severity and number of self-reported ADHD symptoms has been reported amongst adolescents[31]. It is possible that the elevated rates of caffeine intake among adolescent gamblers observed in this study might reflect compensatory behaviors aimed at reducing impulsivity, however further research is needed to explore this and other hypotheses.

Mood—Partially consistent with our third hypothesis, problem/pathological gambling was associated with increased likelihoods of dysphoria/depression in comparison to both low-risk and at-risk gambling. Our findings of an association between gambling and dysphoria/ depression among adolescent gamblers is consistent with one previous report[14] and suggest that dysphoria/depression may develop typically in association with the most severe patterns of gambling in adolescence or vice versa.

Aggression—Consistent with our fourth hypothesis, both at-risk and problem/pathological gamblers were more likely than non-gamblers and low-risk gamblers to report engagement in aggressive behaviors (e.g., physical fights). In comparison to low-risk gamblers, at-risk gamblers were 1.6 times more likely to report carrying a weapon to school, whereas problem/pathological gamblers were 2.9 times more likely to report carrying a weapon to school when compared to at-risk gamblers, suggesting a positive association between gambling problem severity and violent behaviors in adolescence. These findings are consistent with Jackson and colleagues[15] and with previous research demonstrating an association between other impulsive behaviors (e.g. cigarette smoking, alcohol and substance use) and increased aggression amongst adolescents[32]. It is possible that common etiological factors might underlie the increased prevalence rate of aggressive behaviors amongst at-risk and problem/pathological gamblers (e.g. abnormalities in prefrontal cortical

(PFC) regions associated with response inhibition[33, 34]). Further research investigating the interaction between multiple risk behaviors and adolescent aggression/violence could help in designing interventions aimed at reducing a broad range of detrimental behaviors in adolescence.

Weight—Contrary to our fifth hypothesis, no significant differences in BMI were observed across gambling groups. In adult populations, a significant positive association between symptom severity and BMI has been reported in treatment-seeking problem and pathological gamblers[4] and increased prevalence rates of obesity have been reported among at-risk gamblers[2]. The apparent difference between adult and adolescent samples might reflect multiple factors. For example, it is possible that developmental factors (e.g. pubertal stage) might partially mediate associations between weight and gambling behaviors in adolescence; as such, it is possible that the magnitude of the association between BMI and gambling may strengthen over time. It is additionally possible that associations between BMI and gambling behaviors are not present in adolescence but rather develop as a function of the course of the disorder.

Gambling behaviors/motivations

Largely consistent with our sixth hypothesis, at-risk and problem/pathological gambling (in comparison to low-risk gambling) were each associated with more severe gambling behaviors (e.g., time spent gambling) and differences in gambling motivations, and these associations were frequently - but not uniformly - stronger among problem/pathological gamblers. Specific differences between the problem/pathological gambling and at-risk gambling groups suggest that certain changes in gambling-related behaviors (e.g., gambling by oneself) might reflect a transition towards a particularly severe pattern of gambling amongst adolescents, and such information might be utilized to enhance screening and intervention efforts.

Gambling types—To our knowledge, this is the first study to compare strategic versus non-strategic gambling amongst adolescents stratified by gambling problem severity. When compared to low-risk gamblers, at-risk gamblers were more likely to endorse both strategic and machine gambling, and less likely to endorse non-strategic gambling. Whereas problem/pathological gamblers were more likely than both low and at-risk gamblers to endorse machine gambling, problem/pathological gamblers were only more likely than at-risk gamblers to endorse non-strategic gambling. Given the typically illegal nature of gambling among the majority of participants included in these study (i.e., individuals < 18 years), differences in types of gambling may be due to the relative accessibility of strategic versus non-strategic and machine-based forms of gambling, and perhaps not reflective of individual gambling preferences, however further research is needed to explore this and other hypotheses. Such research may aid in the creation of novel interventions for gambling and influence current gambling laws (e.g., more stringent ID requirements for casino gambling).

Gambling locations—In comparison to low-risk gamblers, both at-risk and problem/pathological gamblers were more likely to report gambling online, casino gambling and gambling on school grounds. Problem/pathological gamblers were additionally more likely than at-risk gamblers to endorse gambling across locations, suggesting a positive association between gambling problem severity and gambling engagement across multiple locations/modalities. These data additionally suggest that problem/pathological adolescent gamblers may be especially likely to engage in risky/illegal forms of gambling (e.g. on school grounds; casino gambling). Future studies should investigate how adolescents partake in illegal gambling (e.g., get into casinos and bet).

Consistent with previous research suggesting that under-age gamblers may be particularly likely to utilize the internet for gambling[5], participants in all three of our gambling groups reported on-line gambling with more than half of problem/pathological gamblers reporting gambling on-line. Among college students, on-line gambling is particularly prevalent among pathological gamblers and is associated with negative measures of mental health independent of gambling problem severity[35]; as such, further research is needed to assess the impact of on-line gambling in adolescent populations. Given the growth of on-line gambling over the past decade, in combination with the increasing popularity of internet-based activities (e.g. social networking sites) among school-aged children and adolescents, it is possible that on-line gambling in adolescent populations may represent a growing problem. Further research using longitudinal study designs is needed to examine these and other hypotheses, and to investigate further the relationship between on-line gambling and gambling problem severity in adolescence.

Over 40% of participants in the problem/pathological gambling group reported casino gambling. As the legal age for casino gambling in the state of Connecticut is 21 years, casino gambling is not legal for the vast majority of high school students in the state. As with on-line gambling, casino gambling is relatively unique from other forms of gambling and may be particularly associated with other risky behaviors, such as alcohol use[36]. Connecticut, the site of this survey, has two large casinos, and an association between casino proximity and the prevalence of problem/pathological gambling has been reported in a national study[5]. As such, further research is required to determine the extent to which our findings are generalizable to adolescent populations in other states with fewer/less accessible casinos.

Gambling motivations—In comparison to low-risk gamblers, both at-risk and problem/pathological gamblers were more likely to report excitement, financial, escape and social motivations for gambling. One previous study comparing motivations to gamble among adolescent and adult gamblers found that adolescents were more likely to report gambling for social reasons, whereas adults were more likely to gambling for financial and escape reasons[10]. In contrast, our findings suggest that a diverse range of motivations influence adolescent gambling. Further research using an adult comparison group is needed to determine the relationship between adult versus adolescent motivations to gamble.

Gambling urges—Differences in subjective emotional states related to gambling were observed across gambling groups. The findings suggest that both moderate and problem/pathological gamblers may be likely to experience gambling urges accompanied by negative subjective emotional and physiological states, and additionally suggest a positive correlation between gambling problem severity and intensity of subjective emotional states prior to gambling in adolescence. A previous study has found an association between intensity of gambling urges and treatment response[37]. As such, treatment interventions specifically targeting the emotional and physiological correlates of gambling urges may be particularly efficacious in reducing gambling behaviors in adolescents; however, further research examining the interaction between anxiety, urge states and gambling in adolescence is needed.

Gambling partners—In comparison to low-risk gamblers, both at-risk and problem/pathological gamblers were more likely to report gambling with adults, gambling with strangers and gambling alone, whereas problem/pathological gamblers were more likely to report gambling with strangers and gambling alone – and less likely to report gambling with friends – in comparison to at-risk gamblers. These findings suggest that changes in the social aspects of gambling may occur over time as a function of the progression of the disorder, with at-risk gamblers more likely to gamble with friends, and problem/pathological

gamblers more likely to gamble in isolation. This hypothesis is supported by findings of an increased likelihood of engagement in types of gambling that can be done in isolation (e.g. internet gambling), as well as non-social motivations for gambling (i.e. escape) among problem/pathological gamblers. However, further research using longitudinal designs is needed to explore these and other hypotheses.

Gambling onset and duration—In comparison to low-risk gamblers, at-risk and problem/pathological gamblers were more likely to report greater amounts of time spent gambling per week. Problem/pathological gamblers were additionally more likely than at-risk gamblers to endorse increased amounts of time spent gambling per week, suggesting an additive relationship between gambling problem severity and time spent gambling in adolescents.

Problem/pathological gamblers were more likely than low-risk and at-risk gamblers to report an initial age of gambling onset   8 years of age, and additionally more likely than low-risk gamblers to report an initial age of gambling onset between 9 and 11 years. In adult populations, problem/pathological gamblers often report an age of onset prior to 18 years of age, and earlier ages of onset are associated with a greater severity of comorbid substance use behaviors[9], [10]. There has been one longitudinal study of adolescent gambling behaviors comparing gambling problem severity between early and late onset male adolescent gamblers, which reported no differences in gambling problem severity between groups[38]. However, the study conducted by Vitaro et al.[38] did not include information on gambling prior to age 11. Taken together with our findings, these data suggest that very early ages of gambling onset (i.e.   11 years) may be the most robust age-related predictor of both moderate and problem/pathological gambling in adolescence. However, the extent to which the inverse association between an early age of gambling onset and gambling problem severity reported in adult populations is also observable in adolescent populations – particularly with respect to very early ages of gambling onset (e.g.   8 years) - requires further examination using longitudinal designs.

Study strengths and limitations

This study has several strengths, including the presentation of novel data from a large sample of high school students from the state of Connecticut. While there have been two previous studies of adolescent characteristics stratifying for different levels of gambling problem severity, this is the first such study of adolescents in the U.S.A. Unlike previous adolescent studies, this study included participants across four different gambling categories: non-gamblers, low-risk gamblers, at-risk gamblers and problem/pathological gamblers. This stratification allowed for multi-level comparisons across a range of health/functioning and gambling measures, as has been done previously in adult populations (e.g. Desai et al.[2]; Shaffer et al.[24], Desai et al.[25]). Further strengths of this study include the use of all ten DSM-IV criteria for PG to define gambling groups and assessment of a broad range of gambling and other risk behaviors.

This study includes several limitations, including inherent survey limitations such as responder biases (e.g., non-response may have caused biases in an unknown direction), and reliance on self-report, potentially leading to inaccurate recall of past behaviors (e.g., age of gambling onset prior to age 8). Given the often illegal nature of several variables of interest (e.g. illicit substance use; gambling amongst study participants < 18 years), it is also possible that participants may have deliberately failed to report engagement in certain activities, leading to overly conservative prevalence estimates. It is additionally possible that some students may have over-reported engagement in certain gambling behaviors (e.g., younger students might over-report gambling behaviors in order to appear more mature).

However, previous studies have demonstrated elevated rates of gambling behaviors even in younger populations (e.g., elementary and middle school-aged children)[26]. Another limitation of the present study is the absence of clinician-validated DSM-IV diagnoses of PG. Although this is the first study to stratify by different levels of gambling problem severity in a sample of adolescents from the U.S.A., the extent to which our findings are applicable to populations outside the state of Connecticut is unclear, and further research is needed to determine the relative uniformity of adolescent gambling behaviors across states. A further limitation of this study is the large number of survey respondents without sufficient data to be classified into gambling groups (n = 2,039). However, the percentage of participants with sufficient data (54.92%) is comparable to previously published completion rates in relation to alcohol categories derived from this survey[18]. Some domains of risk-taking (e.g., sexual behaviors) were not assessed and should be examined in future studies. Finally, the cross-sectional design of this study prevents us from making inferences about causality between variables; as such, further research using longitudinal designs is needed to determine the temporal relationship between multiple health and risk variables across different levels of gambling problem severity in adolescence.

Conclusion

Adolescence represents a particularly vulnerable period for engagement in risky behaviors and for the development of addictions[39, 40]. Not surprisingly, the majority of adolescents included in this study reported engagement in some form of gambling. While problem/pathological gambling was most strongly associated with health and functioning impairments, less severe levels of gambling were additionally associated with a range of health and functioning impairments in comparison to non-gamblers, suggesting that even subsyndromal levels of gambling may be a risk factor in adolescence. Our findings of impairments across a wide range of health/functioning measures among adolescent problem/pathological gamblers, consistent with previous research demonstrating significant gambling-associated impairments in adult and adolescent populations, highlight the need for further study of gambling and other risky behaviors in adolescence and the development of improved prevention and intervention strategies.

Acknowledgments

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Table 1

Demographic characteristics of gambling groups

Variables		Non-Gamblers (n = 454)		Low-Risk Gamblers (n = 1340)		At-Risk Gamblers (n = 432)		Problem/Pathological Gamblers (n = 258)		x^2	P-value
		Total	%	Total	%	Total	%	Total	%		
Race/Ethnicity											
African American	Yes	68	14.98	124	9.25	59	13.66	51	19.77	28.8616	<.0001
	No	386	85.02	1216	90.75	373	86.34	207	80.23		
Caucasian	Yes	282	62.11	994	74.18	311	71.99	154	59.69	38.5176	<.0001
	No	172	37.89	346	25.82	121	28.01	104	40.31		
Asian	Yes	30	6.61	54	4.03	16	3.70	21	8.14	12.2202	0.0067
	No	424	93.39	1286	95.97	416	96.30	237	91.86		
Other	Yes	89	19.60	220	16.42	66	15.28	52	20.16	5.1220	0.1631
	No	365	80.40	1120	83.58	366	84.72	206	79.84		
Hispanic	Yes	73	17.02	191	14.92	64	15.53	66	27.39	23.1457	<.0001
	No	356	82.98	1089	85.08	348	84.47	175	72.61		
Gender											
Male		166	36.97	691	52.23	327	76.58	200	79.37	203.1148	<.0001
Female		283	63.03	632	47.77	100	23.42	52	20.63		
Grade											
9th		115	25.39	388	29.06	145	33.56	79	30.98	17.5467	0.0408
10th		114	25.17	356	26.67	108	25.00	69	27.06		
11th		149	32.98	355	26.59	99	22.92	57	22.35		
12th		75	16.56	236	17.68	80	18.52	50	19.61		
Age											
<14		11	2.43	32	2.40	12	2.78	5	1.94	22.3916	0.2151
14		40	8.83	139	10.41	40	9.26	26	10.08		
15		101	22.30	333	24.94	127	29.40	62	24.03		
16		131	28.92	377	28.24	103	23.84	70	27.13		
17		107	23.62	308	23.07	94	21.76	58	22.48		
18		52	11.48	134	10.04	46	10.65	28	10.85		
>19		11	2.43	12	0.90	10	2.30	9	3.49		

Variables	Non-Gamblers (n = 454)		Low-Risk Gamblers (n = 1340)		At-Risk Gamblers (n = 432)		Problem/Pathological Gamblers (n = 258)		x^2	P-value
	Total	%	Total	%	Total	%	Total	%		
Family Structure										
One parent	99	22.30	330	25.00	89	21.09	58	23.20	45.6769	<.0001
Two Parent	315	70.95	920	69.70	303	71.84	150	60.00		
Other	30	6.76	70	5.30	30	7.11	42	16.80		

Table 2

Adjusted odds ratios of health and functioning measures across gambling groups

Variables	Non-Gamblers vs. Low-Risk Gamblers		At-Risk Gamblers vs. Low-Risk Gamblers		Problem/Pathological Gamblers vs. Low-Risk Gamblers		Problem/Pathological Gamblers vs. At-Risk Gamblers	
	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value
Academic and Extracurricular								
Grade Average[1]								
Mostly B's	0.6680	0.0121	1.0900	0.6281	0.8240	0.4434	0.8080	0.3898
B's and C's	0.6730	0.0175	1.1330	0.4876	1.2170	0.4101	1.1810	0.4781
C's and D's	0.8870	0.5969	1.3340	0.2171	1.1090	0.7451	1.0260	0.9355
D's or lower	0.5270	0.3196	2.4550	0.0263	7.5570	<.0001	5.5990	<.0001
Any Extracurricular	0.6940	0.0046	1.1970	0.2166	1.1470	0.4484	1.0930	0.6146
Substance Use								
Cigarette Smoke[2]								
Occasionally	0.5360	<.0001	1.5110	0.0028	1.9990	0.0003	1.7690	0.0020
Regularly	0.5190	0.0010	1.3840	0.0662	4.2060	<.0001	3.8320	<.0001
Marijuana Lifetime	0.5560	<.0001	1.2290	0.1051	3.3110	<.0001	3.1230	<.0001
Alcohol Lifetime	0.2380	<.0001	1.1110	0.6204	1.2020	0.4694	1.1670	0.5325
Current Alcohol Frequency[3]								
Light	0.8410	0.4312	1.2410	0.2624	1.4160	0.2532	1.3270	0.3436
Moderate	0.5880	0.0228	1.3360	0.1287	2.2150	0.0053	2.0320	0.0112
Heavy	0.3210	0.0031	1.4010	0.1776	5.0310	<.0001	4.5400	<.0001
Other Drug Use Lifetime	0.5040	0.0109	1.0880	0.7073	5.8090	<.0001	5.6780	<.0001
Caffeine[4]								
1–2 cups/day	0.8110	0.0007	1.2850	0.6650	0.9130	0.0170	0.6110	0.0185
3+ cups/day	0.5280	<.0001	1.6080	0.4806	2.3670	0.0323	1.5100	0.0425
Mood								
Dysphoria/depression	0.8180	0.1996	1.1920	0.2838	4.1530	<.0001	3.9460	<.0001
Aggression								
Serious Fight	0.5010	0.0256	1.0200	0.9323	6.4840	<.0001	6.4470	<.0001
Weapon	0.4730	<.0001	1.6880	0.0001	3.4030	<.0001	2.8910	<.0001

Variables	Non-Gamblers vs. Low-Risk Gamblers		At-Risk Gamblers vs. Low-Risk Gamblers		Problem/Pathological Gamblers vs. Low-Risk Gamblers		Problem/Pathological Gamblers vs. At-Risk Gamblers	
	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value
Weight								
BMI[5]								
Underweight	0.8600	0.4782	0.9670	0.8788	1.2740	0.3805	1.2840	0.3550
Overweight	1.1510	0.4020	1.0590	0.7348	1.0890	0.6944	1.0720	0.7435
Obese	1.0790	0.7587	1.3060	0.2495	1.0700	0.8271	0.9850	0.9599

[1] Referent = Mostly A's;

[2] Referent = Never;

[3] Referent = Never Regular;

[4] Referent = None;

[5] Referent = Normal Weight BMI = Body Mass Index

Table 3

Adjusted odds ratios of gambling behaviors across gambling groups

Variables	At-Risk Gamblers vs. Low-Risk Gamblers		Problem/Pathological Gamblers vs. Low-Risk Gamblers		Problem/Pathological Gamblers vs. At-Risk Gamblers	
	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value
Gambling Types						
Strategic	7.0460	0.0011	2.1490	0.0888	0.3050	0.0978
Nonstrategic	1.4640	0.0070	2.4960	<.0001	1.7050	0.0150
Gambling Locations						
Online	1.7870	0.0001	6.0560	<.0001	3.3900	<.0001
School Grounds	3.3440	<.0001	6.2960	<.0001	1.8830	0.0013
Casino	1.7260	0.0152	9.5690	<.0001	5.5440	<.0001
Gambling Motivations						
Gamble for Excitement	2.9990	<.0001	2.7800	<.0001	0.9270	0.7317
Gamble for Financial	3.0280	<.0001	4.1420	<.0001	1.3680	0.1193
Gamble for Escape	2.1470	<.0001	4.2500	<.0001	1.9800	<.0001
Gamble for Social	1.7330	<.0001	2.4130	<.0001	1.3920	0.0587
Gambling Urges						
Pressure	2.0160	0.0019	8.0070	<.0001	3.9710	<.0001
Anxiety	2.8490	0.0140	43.7130	<.0001	15.3440	<.0001
Gambling Partners						
Gamble w/ Adults	2.0930	<.0001	2.7850	<.0001	1.3310	0.1040
Gamble w/ Family	1.6080	<.0001	1.2930	0.0897	0.8040	0.1995
Gamble w/ Friends	2.3980	<.0001	1.1260	0.4884	0.4700	0.0004
Gamble w/ Stranger	2.5170	<.0001	9.8120	<.0001	3.8980	<.0001
Gamble Alone	1.8690	0.0059	6.4330	<.0001	3.4420	<.0001
Gambling Onset and Duration						
Time Spent Gambling[1]	2.9990	<.0001	9.4290	<.0001	3.1440	<.0001
Age 1st Gambled[2]						
8 years	1.1820	0.4897	2.8080	0.0001	2.3760	0.0052
9–11 years	1.4780	0.0625	2.2270	0.0022	1.5070	0.1580

Variables	At-Risk Gamblers vs. Low-Risk Gamblers		Problem/Pathological Gamblers vs. Low-Risk Gamblers		Problem/Pathological Gamblers vs. At-Risk Gamblers	
	Odds Ratio	P-value	Odds Ratio	P-value	Odds Ratio	P-value
12–14 years	1.4470	0.0269	1.0840	0.7330	0.7490	0.2667

[1]Referent = 1 hour or less;

[2]Referent = 15+