

# Gender Differences in Adolescent Gambling

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**Background.** Although adolescent gambling has been linked to a wide array of risk behaviors, little is known regarding the correlates of gambling in adolescent girls as compared with adolescent boys.

**Methods.** We examined by logistic regression a nationally representative U.S. sample ( $n = 534$ ) of 16- and 17-year-olds from the 1998 Gambling Impact and Behavior Study (GIBS) (1) to investigate the influence of gender on: 1) the association between gambling and psychiatric symptomatology; and, 2) gambling attitudes and behaviors.

**Results.** Gambling was associated with elevated rates of alcohol use and abuse/dependence in both boys and girls, and dysphoria/depression in girls only. Boy gamblers reported heavier gambling and higher rates of gambling problems than did girl gamblers.

**Conclusions.** Adolescent gambling may be associated with more severe psychiatric symptoms in girls than in boys, though future research will be needed to replicate and extend these findings. Gender considerations are important in understanding youth gambling and the relationship between gambling and psychiatric disorders in adolescents.

**Keywords** Gambling, Substance abuse, Mental health, Adolescents, Gender, Depression

Adolescence represents a critical developmental period characterized by heightened engagement in a variety of risk behaviors including substance use, sex, and gambling (2–6). Over recent decades, gambling opportunities and venues have multiplied, making gambling an increasingly accessible, socially acceptable and popular activity (7). Concurrently, rates of adolescent gambling increased. For example, studies conducted in the 1980s found 45% of adolescents having gambled, while those conducted in the late 1990s observed 66% (8). An independent meta-analysis of gambling studies among adolescents concluded that between 77% and 83% had gambled within the past year, with rates of gambling problems found to be several fold higher in adolescent gamblers as compared with adults (9,10).

Although considerable research has focused on problem and pathological gambling, less has examined subsyndromal levels of gambling. There are multiple reasons for examining the impact of gambling in general in adolescents. First, many forms of gambling that are legal for adults are illegal for

adolescents. These restrictions suggest that adolescent engagement in gambling may be more harmful, deviant or socially unacceptable than for adults. Second, in adults, recreational gambling, that falling below the threshold for problem or pathological gambling, has been associated with adverse mental health. For example, data from the Epidemiological Catchment Area study found elevated rates of psychiatric disorders in both recreational and problem gamblers as compared with non-gamblers (11). Similarly, both gambling and problem gambling have been associated with a variety of risk behaviors in high school students (12). Third, the larger number of individuals without gambling problems suggests that investigations that include subsyndromal levels of gambling have significant public health implications (12–15).

Adolescent gambling and problem gambling are associated with other risk behaviors, psychiatric symptoms, poor academic performance, delinquency, and family conflict (6,16,17). Early age at onset of gambling has been associated with gambling problems later in adolescence, severity of psychiatric symptoms (depression, suicide attempts, and oppositional behaviors) in adolescents, and alcohol and drug abuse/dependence in young adults (18–20). Similar associations have been found between early age at onset of substance use and

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risk of later substance addiction (21–23). Together, these findings suggest that, like with other addictive behaviors, gambling that begins in adolescence has adverse implications for adult psychiatric functioning, and they highlight the importance of this critical period of development for psychiatric health across the lifespan.

An important step in determining the risk posed by adolescent gambling involves obtaining a more complete understanding of the impact of gambling on adolescent health. As in other areas of medicine (24), relatively few studies have systematically examined gender differences in gambling. Significant gender differences have been observed in adults with gambling problems (24–30). One difference consistently observed is the report of higher rates of slot machine gambling problems in women as compared with men (24–27). However, likely given legal age limitations on casino gambling, relatively few adolescents acknowledge slot machine gambling (16). As such, findings from gender studies of adult gamblers are likely not to extend uniformly to adolescents, and direct examination of adolescents is needed.

Gender-related differences seem particularly salient in adolescents due to differences in the types and influences of peer pressure and group behaviors (31,32), differing attitudes towards gambling (33,34), and altered patterns of gambling behavior across gender (33,34). Health factors that may correlate with gambling also may differ in adolescent girls and boys. For example, adolescent girls are less likely than boys to abuse substances and perform delinquent, illegal, or violent behaviors (35–37). In contrast, girls are more likely than boys to experience mood disturbances, particularly depression (38).

Gambling patterns differ between boys and girls. Boys generally begin gambling earlier in life, gamble more frequently, and experience more gambling problems than girls (39–41). Studies have observed gender differences in the progression of gambling as compared with other risk behaviors. Whereas proportions of 6th, 9th and 12th grade boys gambling and using drugs increased incrementally across grade, a smaller increase in gambling was observed in girls (35,42). An independent study of substance abusing adolescents found that although boys were more likely to gamble and gamble more heavily, girls had on average an earlier age at gambling onset (16). Taken together, these studies suggest important gender differences exist in patterns of youth gambling, and more research is needed to understand better the relationship between gambling and psychiatric risks and disorders in girls and boys.

The current study examines two main questions. First, do associations between symptoms of depression, alcohol abuse/dependence, and drug abuse/dependence and gambling in adolescents differ across gender groups? Second, do the gambling attitudes and behaviors of adolescent boys and girls differ? Both questions are investigated using data from a random digit dialing telephone survey of a nationally representative sample of U.S. adolescents aged 16–17. Given general gender-related

differences in adolescents and differences in psychiatric symptoms across gender, we hypothesized that gambling in girls would be associated with reports of dysphoria or depression and gambling in boys with substance use. We also hypothesized, given the tendency for boys to exhibit more impulsive behaviors than girls, that male adolescent gamblers would display evidence of heavier gambling (i.e., greater quantity/frequency of gambling).

## METHODS

A protocol for analysis of data from the Gambling Impact and Behavior Study (GIBS) was presented to the Yale Human Investigations Committee and the study was found to be exempt from review because the data had been stripped of identifiers in preparation for public use.

### *Participants/subjects*

Data for this study came from the GIBS (1), a national survey conducted by the National Opinion Research Center to examine the impact of gambling in the United States and performed in preparation for the National Gambling Impact Study Commission report (43). The survey included a random digit dialing national household survey of youths ages 16–17 (44). Details of the methodology are described elsewhere (1). Briefly, the GIBS adolescent survey employed two lists of phone numbers: one that consisted of 5,000 households with known members aged 12–17, and a second of 32,000 random digit dialing numbers targeting all households. The youth-targeted list was compiled using school registration, magazine subscriptions, and driver's license registries. The lists were generated separately for states with and without state-sponsored lottery in order to ensure an adequate sample from both types of states. Contacted households were queried about ages of household members, and adolescents who were 16 or 17 were interviewed with the verbal consent of both a parent and the respondent. The only other inclusion criterion was an ability to complete the interview in English.

A total of 534 interviews were completed with respondents in the appropriate age range (16 or 17 years old), of whom 469 (87.8%) resided in lottery states and 65 (12.2%) resided in non-lottery states. The proportions are largely representative of the percentage of states having lotteries at the time of the study (1); this sampling is relevant to adolescent gambling because prior reports have estimated the prevalence of lottery gambling in adolescents in the range of 15% to 25% (45). Analyses of the adolescent sample conducted by NORC revealed that the North-Central region of the country was over-represented, and that African American and Hispanic youth were under-represented (1). Consequently, weights were calculated that adjusted for these imbalances, so that the final sample was weighted to represent the U.S. population of 8.3 million 16- and 17-year-olds as presented in *Current Population Estimates* (1).

### *Study Measures*

Past-year gambling was defined as any betting activity or game involving money stakes within the prior year. No monetary threshold for gambling was used in the GIBS adolescent survey. Race/ethnicity was the only sociodemographic variable used in the current analyses since there was too little variation in variables such as age and education, and estimates of family income reported by adolescents were judged to be of limited reliability to be used in data analysis.

As mentioned in previous published reports from these data, full diagnostic psychiatric assessments were not available for survey participants, and the length and methodology of the study dictated that only a limited amount of information could be collected on respondent's mental health. Mental health variables included reports of past-year alcohol use and abuse/dependence, drug use and abuse/dependence, and any substance abuse/dependence, lifetime dysphoria/depression, and past-year mental health treatment. Past-year alcohol use was defined as reporting having consumed alcohol on at least 12 days in the previous 12 months. This threshold, used as a gateway question for assessment of past-year alcohol abuse/dependence, was based upon methodology used in the National Household Survey on Drug Abuse (NHSDA) and was designed to capture the majority of alcohol-dependent respondents while minimizing respondent burden (1,46). Respondents with reported alcohol use were further asked questions assessing DSM-IV criteria for abuse/dependence (i.e., questions about tolerance, withdrawal, and adverse physical or social effects of use).

Past-year drug use and abuse/dependence were similarly assessed using items from the NHSDA. Respondents needed to meet a threshold criterion of use of a drug (not including nicotine or caffeine) for non-medical purposes on at least five days in the previous year in order to be asked follow-up questions assessing abuse/dependence, including aspects of tolerance, withdrawal and interference in areas of life functioning. The GIBS assessed use and abuse/dependence of alcohol, marijuana or hashish, cocaine or crack, stimulants like methamphetamine, amphetamines or speed for non-medical reasons, and tranquilizers such as benzodiazepines for non-medical reasons.

Lifetime dysphoria/depression was measured using two questions used to assess major depression in the Diagnostic Interview Schedule (a lifetime history of two weeks when the respondent either felt sad, empty and depressed all the time or lost interest in most things previously found enjoyable). As with measures of drug and alcohol use, questions were designed to capture the majority of respondents with a history of depressive symptoms while minimizing respondent burden. Past-year mental health treatment sought was assessed by the question, "Since [DATE 12 MONTHS AGO], have you gone to a clinic, doctor or counselor, or outpatient treatment for problems with your emotions, nerves, or mental health?"

Gambling-related variables included the following: at-risk/problem gambling, reasons for gambling, gambling frequency

and quantity, types of gambling performed, and preferred types of gambling. A respondent was classified as an at-risk/problem gambler if they endorsed in the past year one or more DSM-IV inclusionary criteria for pathological gambling (47) using the NORC Diagnostic Screen (NODS) (1). A less stringent threshold to define at-risk/problem gambling than is used in the DSM for pathological gambling (5 or more symptoms) was employed given the largely illegal nature of gambling during adolescence. The approach of using one or more inclusionary criteria to define at-risk/problem gambling has been previously employed in analyses of data from other epidemiological gambling surveys (2,11,16).

Most gambling measures (reasons for gambling, age of gambling initiation, and quantity/frequency measures) were adapted directly from the GIBS (44) as presented in the tables. Categories grouping types of gambling and favorite forms of gambling were generated as described in previous studies of the adult GIBS survey (13,14). Games were categorized into strategic and non-strategic in order to examine games played as well as favorite games. Strategic games are those where an element of skill has a demonstrable effect upon the likelihood of winning (e.g., poker), while non-strategic games are those of pure chance (e.g., bingo).

### *Data Analyses*

Data analyses were performed largely as described in prior publications from our group examining GIBS data (13,14). First, the sample was divided into males and females, and each group subsequently into past-year gamblers and non-gamblers. These four groups were initially compared by Chi-square analysis on race/ethnicity. Second, logistic regression models were used to compare gamblers to non-gamblers within each gender group on mental health measures. All mental health comparisons were adjusted for between-group differences in race/ethnicity, and the comparison on past-year mental health treatment was additionally adjusted for between-group differences in past-year substance abuse/dependence and lifetime dysphoria/depression. Third, interaction terms were used to test whether males and females differed in the association between gambling and mental health measures. Finally, logistic regression analyses were used to compare male and female past-year gamblers on patterns of gambling. These comparisons were adjusted for between-group differences in race/ethnicity, past-year substance abuse/dependence, lifetime dysphoria/depression, and past-year mental health treatment sought. All analyses were conducted using the SAS System (Cary, NC), and weighted to represent the national sample of 16- and 17-year-old adolescents.

Parameter estimates presented are weighted and adjusted odds ratios (ORs). ORs were tested for significance using a two-sided Wald Chi-square test whose null hypothesis is that the OR is equal to 1, or no association. Confidence limits around the ORs were calculated at 95%.

RESULTS

Gambling and Gender

The sample included 265 girls (49.6%) and 269 boys (50.4%). Percentages of girls and boys acknowledging past-year gambling were 35.0% and 53.0%, respectively ( $df = 1$ ,  $X^2 = 17.4$ ,  $p < 0.0001$ ).

Race/Ethnicity

Among girls, there existed a statistically significant difference in racial/ethnic composition between the past-year gamblers and non-gamblers (Table 1). The female past-year gamblers as compared with female past-year non-gamblers included a larger proportion of Hispanic respondents and lower proportions of African Americans and respondents classified as “other race” (Table 1). Among boys, differences in racial/ethnic composition of the past-year gamblers and non-gamblers approached significance (Table 1). The male past-year gamblers as compared with male non-gamblers had greater proportions of African American and Hispanic respondents and lesser proportions of Caucasians and respondents classified as “other race” (Table 1).

Mental Health Variables

Both male and female past-year gamblers as compared to male and female non-gamblers, respectively, were significantly more likely to report past-year alcohol use and alcohol abuse/dependence, with ORs ranging from 2.87 to 4.92 (Table 2). For both boys and girls, the relationship between gambling and drug use was not as robust as for that between gambling and alcohol use (Table 2). Although ORs were 2.12 and 1.92 for the association between past-year drug use and past-year gambling for girls and boys, respectively, the findings each approached but did not reach statistical significance (Table 2). Although ORs for past-year drug abuse/dependence were each elevated above 2 in the past-year gambler versus non-gambler comparisons for the two gender groups, only the finding in

girls (OR of 5.35; 95% confidence interval (CI): 1.93-14.81;  $p = 0.0013$ ) reached statistical significance (Table 2). The interaction between gender and gambling was not statistically significant for the drug abuse/dependence variable, possibly due to insufficient statistical power related to sample size.

Both boys and girls who reported gambling were more likely to endorse symptoms of any substance abuse/dependence (Table 2). This finding is likely largely explained by past-year alcohol abuse/dependence, given the smaller numbers of respondents reporting past-year drug abuse/dependence.

The most robust gender-related differences in the mental health correlates of past-year gambling were observed for the variable of lifetime dysphoria/depression (Table 2). Among girls, past-year gamblers were 4 times more likely to report lifetime dysphoria/depression than non-gamblers (95% CI = 2.31-6.90;  $p = 0.0001$ ); among boys, the OR was 0.90 (95% CI = 0.54-1.48;  $p = 0.66$ ) (Table 2). The interaction term testing for differences between boys and girls in the association between lifetime dysphoria/depression and past-year gambling was significant (OR: 4.47; 95% CI: 2.13-9.39;  $p = 0.0001$ ), providing further support for a female-specific association. There was no association between past-year gambling and mental health treatment sought in either girls or boys, with the low rates of treatment contrasting with the high rates of lifetime dysphoria/depression and past-year substance abuse/dependence in both gender groups of past-year gamblers (Table 2).

Gambling Measures

Among respondents reporting gambling in the previous year, boys and girls reported similar reasons for gambling (Table 3). Girls were less likely than boys to endorse at least one symptom of pathological gambling (OR = 0.33; CI = 0.16-0.65;  $p = 0.0015$ ). Girls were less likely than boys to report heavier gambling as evidenced by quantity/frequency measures. Girls were less likely to report gambling weekly or more frequently (OR = 0.28; CI = 0.10-0.75;  $p = 0.012$ ) and a maximal past-year gambling loss of more than \$100 (OR = 0.03; CI = 0.002-0.45;  $p = 0.012$ ). Despite the gender differences in gambling severity, both girls and boys reported similarly high

Table 1 Racial/Ethnic Characteristics of Male and Female Adolescent Respondents

Variable	Category	Female Adolescents (%)		Chi-Square	P Value	Male Adolescents (%)		Chi-Square	P Value
		Past-year Gamblers (N = 93)	Past-year Non-gamblers (N = 172)			Past-year Gamblers (N = 143)	Past-year Non-gamblers (N = 127)		
Race/Ethnicity	Caucasian	72.9	72.6	10.1	0.018	71.7	79.6	7.1	0.069
	African American	9.3	16.5			16.2	8.0		
	Hispanic	17.4	7.3			9.5	6.2		
	Other	0.5	3.6			2.7	6.2		

Sample sizes (N) listed indicate weighted values; there were no missing data for race/ethnicity.

**Table 2** Mental Health Status Variables in Male and Female Adolescent Respondents

Variable*	Female Adolescents (%)			Male Adolescents (%)			Adjusted Odds Ratios (95% Confidence Interval)			
	Past-year Gamblers (N = 93)	Past-year Non-gamblers (N = 172)	Past-year Gamblers (N = 143)	Past-year Non-gamblers (N = 127)	Female Past-year Gamblers vs Non-gamblers		Male Past-year Gamblers vs Non-gamblers		p value	p value
					Odds Ratio (95% CI)		Odds Ratio (95% CI)			
Alcohol use	34.3	11.8	29.4	13.9	3.74 (1.98, 7.08)		2.87 (1.54, 5.37)		<0.0001	0.001
Alcohol abuse/dependence	23.2	5.5	19.6	7.8	4.92 (2.17, 11.15)		3.17 (1.46, 6.90)		0.0001	0.0036
Drug use	17.9	8.3	18.5	10.9	2.12 (0.98, 4.57)		1.92 (0.95, 3.90)		0.056	0.071
Drug abuse/dependence	15.1	3.2	10.9	5.6	5.35 (1.93, 14.81)		2.08 (0.82, 5.24)		0.0013	0.12
Any substance abuse/dependence	27.7	7.4	21.8	10.3	4.52 (2.17, 9.43)		2.71 (1.34, 5.50)		<0.0001	0.0056
Dysphoria/depression, lifetime	64.0	30.2	36.8	38.3	4.00 (2.31, 6.90)*		0.90 (0.54, 1.48)*		0.0001	0.66
Mental health treatment sought	15.6	9.5	5.5	6.5	0.84 (0.37, 1.93)		0.78 (0.27, 2.22)		0.68	0.64

Sample sizes (N) listed indicate weighted values; The numbers missing (based on sample weights) for each variable are as follows: alcohol use (0), alcohol abuse (1), drug use past year (0), drug abuse past year (1), any substance abuse (1), depression (1), and mental health treatment sought (1).

All odds ratios adjusted for race; Odds ratio for mental health treatment sought additionally adjusted for substance abuse and depression.

\*Interaction term OR = 4.47 (2.13, 9.39),  $p = 0.0001$ ; all other interaction terms non-significant ( $p > 0.05$ ).

\*\* All time frames are in the past year, unless otherwise noted.

frequencies of usually gambling with someone (Table 3), suggesting that peer interactions influence the decision of both groups to gamble.

By and large, boys and girls did not differ significantly on the types of gambling performed, with both groups acknowledging low rates of casino and machine gambling and high rates of non-casino gambling (Table 3). The groups differed in reported favorite types of gambling (Table 3). Girls as compared with boys were less likely to report strategic forms of gambling as favorite (OR = 0.48; CI = 0.27-0.85;  $p = 0.012$ ) and more likely to report non-strategic forms as favorite (OR = 2.93; CI = 1.57-5.46;  $p = 0.0007$ ).

## DISCUSSION

### Summary

The present study is among the first to use a nationally representative sample to investigate systematically gender-related differences in the psychiatric associations and patterns of adolescent gambling. Gambling in girls was more strongly associated with lifetime dysphoria/depression than was gambling in boys. In comparison, boys who gambled were more likely than girls who gambled to report frequent gambling, larger gambling losses, and symptoms of pathological gambling.

Despite the large proportions of girls and boys reporting psychiatric symptomatology, relatively few reported having sought mental health treatment. The findings highlight the need for a closer examination of the relationship between youth gambling and psychiatric illness in order to accurately assess the risk posed by early onset gambling and improve adolescent mental health prevention and treatment strategies (48,49).

### Gender, Gambling and Sociodemographics

Fewer adolescent girls reported gambling than did adolescent boys, largely consistent with findings from other surveys (6,16,17,40,45,50). The proportions of adolescents acknowledging gambling in the present study are lower than reported in many regional surveys (16,40,50). The reasons for these apparent differences are not known, and could reflect differences in methodologies (e.g., telephone versus school surveys, differences in the questions surveying gambling involvement) or differences between regional and national rates. Although significant differences were observed in racial/ethnic measures in gamblers and non-gamblers, the relatively small number of non-Caucasian subjects in the present survey precludes extensive interpretation. Future investigations involving larger samples appear justified to investigate racial/ethnic differences in the gambling behaviors of girls

**Table 3** Gambling Measure Comparisons in Male and Female Adolescent Past-year Gamblers

Groups, Variables	Female Adolescent Past-year Gamblers (%)	Male Adolescent Past-year Gamblers (%)	Odds Ratio (95% Confidence interval)	p value
Reasons for gambling				
Gambling for social activity	52.3	58.5	0.85 (0.49, 1.45)	0.54
Gambling for personal services	7.1	10.7	0.63 (0.24, 1.65)	0.35
Gambling to be around people	34.8	38.9	0.83 (0.47, 1.45)	0.51
Gambling for excitement	50.4	55.8	0.69 (0.40, 1.19)	0.18
Gambling to win money	60.2	59.9	1.04 (0.59, 1.84)	0.90
Gambling severity in the past year				
At risk/problem gambler (NODS $\geq 1$ )	4.5	12.7	0.33 (0.16, 0.65)	0.0015
Frequency, quantity and patterns of gambling				
Maximum frequency gambled in past year, Weekly or more frequently	6.9	15.9	0.28 (0.10, 0.75)	0.012
Largest win in past year of > \$100	11.4	15.1	0.56 (0.22, 1.43)	0.22
Largest loss in past year of > \$100	0.62	8.8	0.03 (0.002, 0.45)	0.012
Usually gamble with someone (Yes)	92.9	89.3	1.60 (0.59, 4.37)	0.36
Types of gambling performed				
Strategic, any	61.5	70.2	0.66 (0.38, 1.14)	0.14
Non-strategic, any	47.7	36.0	1.48 (0.86, 2.56)	0.16
Machine, any	8.2	5.5	1.54 (0.55, 4.34)	0.41
Casino, past year	4.2	1.3	3.10 (0.52, 18.55)	0.22
Non-casino, past year	93.1	91.8	0.81 (0.27, 2.37)	0.69
Favorite type of gambling				
Strategic	44.6	59.7	0.48 (0.27, 0.85)	0.012
Non-strategic	35.1	15.6	2.93 (1.57, 5.46)	0.0007
Machine	10.9	4.0	2.39 (0.79, 7.20)	0.12

Sample sizes (N) listed indicate weighted values; The numbers missing (based on sample weights) for each variable are as follows: social activity (1), personal services (5), to be around people (1), for the excitement (1), gambling to win money (1), gamble with someone (4), all other variables have no missing values. Odds ratios adjusted for race, lifetime substance abuse, and lifetime depression.

and boys. For example, cultural norms may affect the likelihood of engaging in gambling, parental response to such behavior, or preferred games.

### ***Substance Use Disorders***

Our hypothesis that gambling would have a stronger correlation with substance use and abuse/dependence in boys as compared with girls was not supported. Specifically, past-year gambling was strongly, and largely similarly, associated with alcohol use and abuse/dependence in both girls and boys, with, if anything, a more robust association between gambling and alcohol abuse/dependence observed in girls. The strong association between adolescent alcohol use and gambling that is largely similar between boys and girls confirms in a national sample findings from regional samples of adolescents (6,17,41).

Factors common to adolescent gambling and alcohol use likely include both genetic and environmental contributions, as these have been observed for pathological gambling, alcoholism, and antisocial behaviors in adult men (51,52). Impulsivity has been proposed as a mediating factor underlying the shared genetic contributions to pathological gambling, alcoholism, and anti-social behaviors (18), and both male and female youth gamblers have been shown to score high on structured measures of impulsivity (53). Neurodevelopmental models of impulsivity suggest that immaturity of brain circuits governing motivation, reward assessment, and decision-making put adolescents at increased risk for experimentation and problems with substances, gambling and other risk behaviors (4,53). Consistent with this notion, children with early age at gambling onset demonstrated persistent teacher-rated impulsiveness and behavioral disinhibition throughout childhood and adolescence, and more severe gambling behaviors by late adolescence (6).

Research has also shown that problem and pathological gamblers are more likely to have Attention Deficit Disorder (ADD) (54–57), a disorder that generally first manifests itself in childhood or adolescence. Unfortunately, the GIBS study did not contain a measure or screen for ADD. However, given the higher rates of diagnosed ADD in boys than girls, the association between ADD and substance use and abuse/dependence, and the apparent comorbidity between ADD and pathological gambling in adults, it seems likely that future research on the effects of gambling on adolescents should take into consideration the presence or absence of ADD.

Environmental factors common to gambling and alcohol use behaviors seem particularly salient for intervention strategies. Consistent with the similarly large proportions of girls and boys reporting gambling with someone, prior studies have found that the initiation and maintenance of adolescent gambling, alcohol use and other risk behaviors frequently involve peer interactions (17,35,45). The exploration of interventions

promoting alternative, less risky forms of social interactions for adolescent girls and boys, particularly those at high risk for developing addictions, seems warranted (48,49).

An unexpected finding involved the magnitude of the correlation between gambling and substance abuse/dependence, and particularly drug abuse/dependence, in girls. Although the statistical interactions for all substance abuse/dependence measures were not significantly different across gender groups (probably due to small sample sizes), the within-gender-group ORs suggest gambling may be a stronger correlate of substance abuse/dependence (particularly drug abuse/dependence) in girls than in boys.

### ***Dysphoria/depression***

As hypothesized, gambling and dysphoria/depression symptoms were strongly associated in girls but not boys. The precise nature of this association is not clear. One possibility is that girls are more likely than boys to gamble to alleviate or avoid depressive symptoms, as has been suggested for women with gambling problems (58). Another possibility is that girls may be more likely than boys to experience depressive symptoms following gambling episodes. A third possibility is that common pathways leading to the co-occurrence of gambling and depression are stronger in girls than in boys. This relationship could be mediated by sex hormones, peer interactions, or other environmental influences. The involvement of genetic factors mediating the relationship between adolescent gambling and depression warrants examination, particularly as a recent investigation suggests that the co-occurrence between pathological gambling and depression in men involves predominantly genetic factors (59).

### ***Mental Health***

The overall health picture, at least as measured by the limited GIBS items for dysphoria/depression and substance use and abuse/dependence, appears worse for girls who gamble than for boys who gamble. It is possible, although speculative, that gambling in boys is more 'normative' and fits naturally into a developmental pattern of experimentation and competitive risk-taking, while among girls it reflects a more deviant developmental path that incorporates other adverse health factors including depression and drug abuse/dependence. From a clinical perspective, the large proportions of girls and boys acknowledging symptoms of substance abuse/dependence and depression contrast with the relatively low proportions reporting having sought mental health treatment. This combination suggests that improved efforts are needed to identify teenage girls and boys with psychiatric symptoms and get them into treatment, if appropriate, and that this need may be particularly important for teenage gamblers.

### ***Gambling Patterns***

Consistent with prior studies and our *a priori* hypotheses, heavier gambling was observed in boys. The finding of an increased impact on some health measures despite less heavy gambling in girls is reminiscent of findings in the alcohol literature in which adult women as compared with men tend to have more severe health problems given similar quantity/frequency measures of alcohol consumption (60). These findings have led to gender-related differences in health guidelines for adult alcohol consumption (61,62). One factor thought to influence these gender-related differences, differential distribution of alcohol due to body weight composition (63), is not applicable to gambling. A “telescoping” phenomenon has been described for the development of gambling problems in women (30) as has been described for other substances of abuse (60,64). Together, these findings suggest that mechanisms unrelated to substance metabolism or distribution are relevant to gender differences in addictive processes.

Although largely similar types of gambling were reported as being performed by boys and girls, significant differences were observed in types of gambling found favorite with girls preferring non-strategic and boys strategic forms. These differences largely mirror the types of gambling found to be problematic for adult women and men with gambling problems (24).

### ***Limitations and Strengths***

There are multiple limitations of the present study. First, as with other surveys, there is limited ability to explore the nature of observed associations given the cross-sectional design. Second, the study employed limited measures of psychiatric disorders, measures designed to capture clinically relevant information while limiting respondent burden. Because these were not diagnostic variables, it is unclear whether observed associations would remain the same if clinical diagnostic assessments were available. Third, relatively few psychiatric symptoms were assessed, so that it is difficult to determine whether, or how, these results might extend to disorders such as anxiety disorders. Fourth, multiple important youth risk behaviors (e.g., sexual behaviors, binge drinking, use of club drugs like ecstasy or gamma-hydroxy-butyrate) were not assessed. Fifth, a telephone-based methodology was employed rather than face-to-face, structured clinical interviews, with an unknown effect upon adolescent responses. Sixth, the participants surveyed were in a narrow age range. Although this feature could be viewed as a strength as it limits age-related variability, it is also a limitation in that many people begin gambling prior to the age of 16 (14,40,41). Consequently, additional studies of younger age groups are warranted. Seventh, the sample was smaller than those assessed in several prior studies (41). In some cases, sample size may have precluded comparisons from reaching statistical significance (e.g., gender differences in the association between gambling and several substance use and

abuse/dependence measures). Despite these limitations, multiple clinically relevant and statistically significant associations were observed.

The current study has multiple strengths. First, the data are nationally representative of the U.S. adolescent population ages 16–17 years, proportionally collected according to state lottery status and weighted to U.S. Census estimates. These features reduce potentially confounding effects of geographic variation in access to, attitudes about, and patterns of gambling that are present in many prior studies of adolescent gambling. Second, this is the first nationally representative study to our knowledge to systematically examine gender differences in gambling in this age group—although there have been previous examinations of gender differences in adolescent gambling, none of them has utilized national data.

### ***Future Directions for Research***

While these data have revealed some potentially important and clinically relevant gender differences in the associations between psychiatric status and gambling, much remains to be done to further explore the reliability of these associations. First, these findings provide further evidence that youth risk behaviors and disorders differentially co-segregate across gender groups. However, more research is needed to identify specific social, parental, and biological factors mediating the relationships. Second, longitudinal studies involving more complete diagnostic assessments are needed to better understand the relationship between adolescent gambling, gender and psychiatric disorders. Monitoring gambling behavior over time, including age at gambling onset, appears particularly important because early age at gambling onset has been associated with depression and suicide attempts in substance-abusing adolescents (35) and substance use disorders in young adult gamblers (18). Third, more research is needed to understand the basis of the observed gender-related differences in quantity/frequency of gambling and its impact on adolescent health and future adult functioning. For example, the extent to which gender-related differences in problem gambling in adults represents impaired control over motivations to engage in forms of gambling preferred as early as adolescence requires further examination. Finally, investigation is needed to understand how best to translate this information into improved prevention and treatment strategies (65).

### ***CONCLUSIONS***

In general, the substantial proportions of adolescents acknowledging gambling, at-risk/problem gambling, and psychiatric symptoms that correlate with gambling suggest that increased attention be focused on this as a potential public health problem (66–68). The observation of significant gender differences in the psychiatric correlates of gambling and in



patterns of gambling highlight the importance of considering youth risk behaviors like gambling within a gender-informed framework.

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