Published in final edited form as:

Am J Addict. 2014 ; 23(5): 510–517. doi:10.1111/j.1521-0391.2014.12142.x.

Examining Potential School Contextual Influences on Gambling Among High School Youth

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Abstract

Background and Objectives—Gambling is an increasing concern among adolescence, yet there has been limited investigation into school-level factors that may increase the risk for gambling. The current study examined the relationship between substance use and gambling, and explored the influence of school context on adolescent gambling.

Methods—Data come from 25,456 students in 58 high schools participating in the Maryland Safe and Supportive Schools Initiative. Youth-reports of socio-demographics, lifetime gambling, and past-month substance use (ie, alcohol, cigarette, marijuana, non-medical prescription drug) were collected. School-level characteristics were student suspension rate, student mobility, percentage of students receiving free/reduce-priced meals, percentage of African American students, urbanicity, gambling prevalence, gambling problem prevalence, and substance use prevalence. Weighted multilevel analyses were conducted.

Results—One-third ($n = 8,318$) reported lifetime gambling, and 10% ($n = 2,580$) of the full sample, or 31% of the gamblers, experienced gambling problems. Being male and alcohol, marijuana, and nonmedical prescription drug use were associated with twice the odds of gambling. Among gamblers, being male, African American, and cigarette, marijuana, and non-medical prescription drug use were associated with higher odds of gambling problems. The school-level factors of suspension rate and percentage of African American had minimal, inverse associations with gambling; however, none were related to gambling problems.

Conclusions—Multilevel results indicated that adolescents that are male and use substances are more likely to gamble and have gambling problems.

Scientific Significance—The findings indicate a need for prevention programs targeting risky behaviors to also target gambling as such behaviors often co-occur among adolescents.

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Declaration of Interest

The authors report no conflicts of interest.

The authors alone are responsible for the content and writing of this paper.

INTRODUCTION

The last decade has seen an unprecedented expansion of legalized gambling in the United States, primarily in an effort by state governments to identify new sources of revenue.¹ Gambling is currently legalized in 48 of the 50 U.S. states.² In Maryland, where the current study takes place, video lottery terminals were legalized in 2008 and table games in 2012. The state has three open casinos, with two more to come in 2014. With the wide availability of gambling outlets coupled with the perception of gambling as a recreational activity, it is unsurprising that 50–70% of adolescents have ever gambled in their lifetime, and 10–15% of adolescents are at risk for gambling problems (eg, lying about gambling).^{3,4} Adolescents at risk for gambling problems could further experience negative financial, interpersonal, academic, criminal, and psychiatric consequences.⁵

The current study aimed to understand individual and school contextual risk factors associated with gambling involvement among high school-aged youth. This study builds on prior work documenting individual risk factors for youth gambling. Specifically, male adolescents have consistently been found to be 3–5 times more likely than female adolescents to report both gambling and gambling problems.^{5,6} Ethnic minorities, particularly African Americans, also report higher prevalence of adolescent gambling and gambling problems than Caucasians.^{7,8}

Alcohol, tobacco, and other substance use are also disproportionately prevalent among adolescent gamblers.^{5,7} Furthermore, Jacobs' General Theory of Addiction defines addiction as a state acquired over time by a predisposed person attempting to relieve a chronic stress condition.⁹ Consequently, such individuals are motivated to seek activities or substances to reach a more comfortable resting state. The link between gambling and substance use suggests that such addictive behaviors share common developmental roots.¹⁰ These associations may be particularly relevant during adolescence, a vulnerable developmental period marked by increased risk-taking. However, while adolescent studies have examined the association between alcohol, tobacco, and marijuana use and gambling,^{5,7} none have investigated the relationship between non-medical prescription drug (NMPD) use and gambling, and one of the current study's aims is to fill that gap.

Furthermore, as adolescents spend more time with their peers and are increasingly sensitive to environmental influences, they become more socially aware and engage in risky behavior under the influence of social pressure.¹¹ The intersection between these developmental and contextual risk factors suggests a need for additional research in relation to adolescent gambling, particularly within the school context where there has been little gambling research. Social disorganization theory, originally applied to communities,¹² has been extended to schools to find that a disorganized school context is linked with various problematic outcomes for adolescents, including substance use and aggressive behavior.¹³ Common indicators of school disorder include urbanicity, a poor school climate, high rates of student behavior problems, concentrated disadvantage, high rates of student mobility.¹³ Students from such schools could be at increased risk for engaging in problem behaviors, such as gambling. However, the extant gambling studies have overlooked the potential influences of school context.

The current study examined the patterns of gambling behaviors among a large, population-based sample of high school-aged youth. The first aim was to examine the relationship between substance use, particularly NMPD, and gambling. We hypothesized that adolescents who are male, African American, and report substance use would be more likely to gamble and have gambling problems. The second aim was to explore influences of school context on adolescent gambling. We hypothesized that the risk for gambling involvement and gambling problems would be greatest among youth attending schools with high rates of school disorder.

METHODS

Participants

Data come from 25,456 youth attending the 58 Maryland high schools in 12 counties participating in a state-wide project focused on measuring and improving school safety, called the Maryland Safe and Supportive Schools (MDS3) Initiative. Students and school characteristics for the current analyses are presented in Table 1.

Procedure

Schools' participation in the MDS3 project was voluntary. Districts were approached for participation by the Maryland State Department of Education (MSDE). Upon expressing interest in MDS3, meetings were conducted to obtain school-level and principal commitment to the project. An anonymous, online student survey was administered in spring 2012, using a passive parental consent process and youth assent process; all participation was voluntary. Letters were sent home to parents providing information about the survey and the larger initiative. The survey was administered online to approximately seven 9th grade classrooms and six 10th, 11th, and 12th grade language arts classrooms. The approximately 25 classrooms per school were selected at random, stratified by grade level and academic level (eg, college preparatory, advanced placement), for inclusion in the study. This level of balance in the classroom-level sampling helped increase the diversity of the sample of classrooms. School staff oversaw the administration of the online survey using instructions provided by the researchers; however, the staff could not see the student responses. Online assessment procedures are used with increased frequency in high school settings, and research suggests that youth are more willing to disclose sensitive information via an on-line survey system than a paper assessment.¹⁴ The non-identifiable data were obtained and approved for analysis by the Institutional Review Board.

Measures

MDS3 Climate Survey—The MDS3 Climate Survey was developed by the Johns Hopkins Center for the Prevention of Youth Violence in collaboration with project partners. Researchers from the Center undertook a comprehensive review of the literature on measures of safety and youth violence. The measure drew heavily from previously published survey indicators, such as items from the 2011 Youth Risk Behavior Surveillance System (YRBS), which have been validated for use in research studies.¹⁵ The self-report measure was used to assess the following variables.

Youth Demographic Characteristics—Participants responded to a series of questions regarding their age, gender, and race/ethnicity.

Gambling—A multi-response question assessed lifetime involvement in several types of gambling activities (ie, lottery, card/dice games, horse/sport bets, casino, slot/poker machines, online gambling, other gambling). Participants indicated all of the activities they had engaged in their lifetime. The Lie/Bet Questionnaire,¹⁶ a widely used screening tool for pathological gambling, next assessed gambling-related problems via the two items of “Have you ever felt the need to bet more and more?” and “Have you ever had to lie to people important to you about how much you gambled?” These two items were selected from the *DSM-IV*¹⁷ criteria for pathological gambling because they were identified as the best predictors of pathological gambling.¹⁶ The Lie/Bet Questionnaire has high sensitivity and specificity,^{16,18} produces similar pathological gambling prevalence as that by the *DSM-IV* criteria,¹⁹ and is applicable for adolescents.²⁰ Gambling and gambling problems were dichotomized as non-gamblers versus gamblers, and no gambling problems versus any gambling problems, respectively.

Substance Use—Four different types of substance use (ie, alcohol, cigarette, marijuana, non-medical prescription drugs [NMPD]) were assessed through YRBS questions.¹⁵ Substance use was dichotomized as no past-month use or any past-month use. The YRBS is a well-validated indicator of substance use.¹⁵

School-Level Indicators—The following school-level variables were obtained from the MSDE for inclusion in the current analyses: student suspension rate (ie, total number of suspension incidents divided by total student enrollment), student mobility (ie, total of entrants and withdrawals from the school divided by total student enrollment), percentage of students receiving free/reduce-priced meals (ie, student SES), and percentage of African American students attending the school. The schools’ urbanicity (ie, urban, sub-urban, rural) was determined by a trained on-site observer as part of a larger observation of the school’s physical environment (average inter-rater reliability = .84). In this paper, two dichotomous dummy variables were created to reflect urbanicity (ie, urban vs. non-urban; rural vs. non-rural). The lifetime gambling, lifetime gambling problems, and past-month substance use (ie, alcohol, cigarette, marijuana, NMPD) prevalence from each school were determined via the student surveys.

Analyses

Sample Weighting—As described by Pfeffermann,²¹ “sampling weights weigh sample data to correct for the disproportionality of the sample with respect to the target population of interest.” Therefore, sample weights were created to adjust for sampling bias that may have occurred when classrooms were selected at random for participation, as students were not randomly assigned to classrooms. The weights adjusted for potential student-level sampling bias and non-participation.²¹ More specifically, sampling weights were created using the raking ratio estimation method,²² an iterative procedure that produces weights for each student using self-reported demographic information on ethnicity, gender, grade level provided by the participants and school-level information on ethnicity, gender, and grade

level obtained from the Maryland State Department of Education. Weights were computed in Stata 11.0 (StataCorp, Stata Statistical Software, College Station, TX).²³ For additional information on the raking procedure, please refer to Battaglia et al.²²

Preliminary analyses were performed in Stata 11.0 to explore correlations and the potential collinearity among the student- and school-level covariates (see Tables 2 and 3). The variation inflation factor (VIF) and tolerance indicated that collinearity among the final set of variables was not a concern.²⁴ Three-level weighted models were conducted in HLM 7.01 to examine the associations between student- and school-level factors and gambling.²⁵ Multilevel analyses were conducted to account for the nested nature of the data where students were nested in classrooms, which were nested in schools. We conducted weighted, multilevel logistic regressions on the dichotomous outcome variables of whether a student had ever gambled and whether a gambler reported any gambling problems; thus, the results are presented as adjusted odds ratios (AORs). Level-1 (ie, student-level) predictor variables included alcohol use, cigarette use, marijuana use, non-medical prescription drug use, age, gender, and race (ie, African American vs. non-African American). The continuous age variable was grand-mean centered while the dichotomous variables were modeled as uncentered. Each level-1 variable was individually tested for randomly varying slopes. At level-2, the classroom-level clustering of students was accounted for, although, no variables were available for analysis. School-level variables were modeled at level-3 and included student suspension rate, student mobility, percentage of students receiving free/reduced meals, percentage of African American students, urbanicity, prevalence of lifetime gambling, prevalence of lifetime gambling problems, prevalence of past-month substance use. The models were built one variable and level at a time to be sensitive to potential concerns regarding collinearity and to ensure the stability of the findings.

RESULTS

Prevalence of Lifetime Gambling and Past-Month Substance Use

One-third (32.8%; $n = 8,318$) of the weighted sample had engaged in at least one gambling activity in their lifetime. Table 1 shows the most commonly reported gambling activity was card or dice games (19.4%; $n = 5,028$), followed by horse or sports bets (11.4%; $n = 2,909$), lottery (8.9%; $n = 2,085$), slot or poker machines (6.9%; $n = 1,748$), online gambling (6.4%; $n = 1,647$), and casino gambling (4.4%; $n = 1,126$). Approximately 12.5% ($n = 3,301$) engaged in other forms of gambling. Among lifetime gamblers, 31.0% ($n = 2,580$) have ever experienced any gambling problems. In terms of past-month substance use, 34.5% ($n = 8,706$) reported alcohol use, 14.0% ($n = 3,390$) cigarette use, 21.2% ($n = 5,337$) marijuana use, and 9.5% ($n = 2,466$) non-medical prescription drug use.

Student- and School-Level Influences on Lifetime Gambling

Table 4 presents the 3-level HLM results examining the student- and school-level influences on lifetime gambling and gambling problems. Males were significantly more likely than females to report lifetime gambling (AOR = 2.70; 95% CI = 2.51, 2.92; $p < .001$). Those with past-month use of alcohol (AOR = 2.12; 95% CI = 1.93, 2.33; $p < .001$), marijuana (AOR = 1.42; 95% CI = 1.28, 1.58; $p < .001$), and NMPD (AOR = 1.86; 95% CI = 1.59, 2.17; $p < .001$)

had increased odds of lifetime gambling. Student age, race, and cigarette use were not related to lifetime gambling.

Conversely, there were fewer findings for the school-level influences on youth gambling. While student suspension rate (AOR = .998; 95% CI = .995, 1.000; $p < .05$) and percentage of African American students (AOR = .999; 95% CI = .997, 1.000; $p < .05$) were inversely associated with gambling, such associations were small in size. Other variables (ie, student mobility, percentage of students receiving free and reduced meals, urbanicity, gambling prevalence, gambling problem prevalence, and substance use prevalence) were not related to this outcome.

Student- and School-Level Influences on Gambling Problems among Lifetime Gamblers

Male (AOR = 1.81; 95% CI = 1.61, 2.04; $p < .001$) and African American (AOR = 1.74; 95% CI = 1.46, 2.08; $p < .001$) gamblers were approximately twice as likely as female and non-African American gamblers, respectively, to have ever experienced any gambling problems. The past-month use of cigarettes (AOR = 1.31; 95% CI = 1.13, 1.51; $p < .001$), marijuana (AOR = 1.18; 95% CI = 1.01, 1.38; $p < .05$), and NMPD (AOR = 2.38; 95% CI = 2.06, 2.75; $p < .001$) were similarly associated with increased odds of gambling problems among lifetime gamblers. Again, age was not related to endorsing gambling problems, nor was alcohol use. None of the school-level characteristics appeared to be related to gambling problems. Random effect results indicate significant variability in gambling among students ($\chi^2 = 1963.702$, $df = 23,693$) but not among schools.

Variability in Gambling and Gambling Problems at Student- and School-Levels

The random effect results indicated significant variability in gambling ($\chi^2 = 1963.702$, $df = 23,693$) and gambling problems ($\chi^2 = 1126.266$, $df = 6,663$) among students but not among schools.

DISCUSSION

The current study used a series of three-level (ie, student, classroom, school) hierarchical linear models to examine student- and school-specific factors on gambling and gambling problems among a large, population-based cohort of high school youth from Maryland. A third of the current sample reported lifetime gambling, which is considerably lower than the 50–70% prevalence found in several other studies.^{3,4} As Derevensky et al.³ noted, there is great variability in the prevalence of reported adolescent gambling, perhaps due to an amalgam of issues such as the characteristics of the sample (eg, age, sex), sampling procedures (eg, telephone surveys, online surveys), and inconsistencies regarding the availability and accessibility of gambling venues.

Whereas data from the Minnesota Student Survey found higher gambling prevalence,⁴ results showed adolescent gambling decreased from 73% in 1992 to 53% in 2007. A potential explanation could be that due to the normalization and pervasiveness of gambling, its novelty may be lost on adolescents, particularly those displaying high sensation-seeking behaviors. Furthermore, with the advent of online social networking sites, adolescents could be spending their free time on their cell phones, computers, and other electronic devices

instead. Thus, the lower prevalence of lifetime gambling observed in the present study could be a true reflection of the current state of adolescent gambling, given that these data were more recently collected than data for other studies. With regard to the pattern of gambling activities, we found that card and dice games were the most commonly reported activity, whereas online (6.4%) and casino (4.4%) gambling were the two least commonly endorsed activities. Given the increasing number of online gambling outlets and the expansion of gambling outlets within the state, it is likely that the online and casino rates could increase.

In contrast, the prevalence of gambling problems among the current sample (10%) was similar to that found previously.^{3,4} Such a consistency could suggest that while fewer adolescents may recreationally engage in gambling activities today, among those who gamble, the risks of developing gambling problems is still high and consistent with previous studies. As a result, gambling problems among youth remains an important public health issue.

With regard to student-level risk factors, we found that males were at increased odds of both lifetime gambling and gambling problems, supporting results from previous studies.^{5,6} However, despite males' higher likelihood of gambling and gambling problems, other studies have found that among adolescents with gambling problems, males and females report similar prevalence of depression, substance use, and conduct disorder.^{6,26} Some studies have explored the gender-specific root causes of gambling. A twin study found genetic factors to account for 85% of the variance in adolescent gambling among males and none of the variance among females.²⁷ Another study found that parents and peers have a greater influence on female than male adolescent gambling.²⁸ Taken together, these studies suggest that while males may have higher gambling prevalence, findings regarding the root causes (and thus, potential areas for intervention) cannot be generalized across genders. More research on the associations between gender and the onset and trajectories of gambling behavior is needed.

Also consistent with past studies is the current finding of the increased odds of lifetime gambling problems among African American adolescents.^{7,8} A potential explanation could be African Americans' generally lower SES,⁸ which has been found to be positively associated with gambling among youth.⁷ Furthermore, growing up in low SES environments, individuals often experience stressful life events, as evidenced by the high rates of high school dropout, incarceration, and unemployment in low SES neighborhoods.²⁹ Using a sample of urban and predominantly African American young adults from Baltimore, Storr et al.³⁰ reported that gamblers experienced a greater number of stressful events than non-gamblers. Gambling activities could act as coping mechanisms, used as a way to dissociate from the stressful life events, and this could be particularly true for African American youth. Unfortunately, the current study did not have information on student-level SES to explore this potential association.

The positive associations between past-month substance use and lifetime gambling and gambling problems reported in the current study are also consistent with previous studies.^{5,7} Whereas previous gambling studies have largely focused on marijuana and alcohol, the current study is one of the first to examine a potential association with non-medical

prescription drug use. We found that youth who used non-medical prescription drugs were at increased odds of gambling, and when they gambled, were at increased odds of having gambling problems. This finding is important because non-medical prescription drug use is a growing public health concern, as the 2011 YRBS found 21% of U.S. high school students to have ever taken prescription drugs without a doctor's prescription.³¹

Regarding our second research aim focused on the school-level factors, the student suspension rate and percentage of African American students were negatively, though modestly so, associated with lifetime gambling in the current study. Previous research has provided mixed results as it relates to school-level factors. One study reported that positive school climate (eg, students feel they are getting good education, feel respected and cared for by adults in schools) was associated with decreased adolescent substance use.³² Another study found elevated alcohol misuse in schools that were socioeconomically advantaged, non-urban, and had a high percentage of Non-Hispanic Whites, characteristics expected to protect against problem behaviors.³³ Botticello³³ conjectured that because alcohol use is so prevalent in today's culture, alcohol misuse could be viewed as a tolerable form of adolescent rebellion without severe consequences or stigma. Perhaps the same could be said about adolescent gambling, as gambling is generally socially condoned with low perceived risks and rampant exposure.³⁴ Furthermore, studies have shown parents from more disadvantaged backgrounds to be more aware of the potential detrimental impact the environment has on their children's behavior while those from more advantaged backgrounds underestimated such impact or assumed impact to be uniformly positive.^{29,33} As a result, future studies should parse out the role parents play in the relationship between adolescent gambling and school contextual factors as parents could be pivotal targets in adolescent gambling prevention programs.

Limitations

The current findings need to be interpreted in light of some limitations. First, the student-level data were based on self-reports, thus subject to both recall bias and social desirability bias. However, the use of an anonymous, online survey to collect such data should minimize such biases. Secondly, the lifetime measures of gambling and gambling problems do not provide indication as to how current the prevalence rates are, age of gambling onset, and source of money. The absence of past-month gambling measures further impedes the examination of the co-occurrence of gambling and substance use. However, the current findings are consistent with past study findings,^{5,7} thus suggesting that the potential bias should be minimal. Another limitation is that only two items were used to assess gambling problems, in contrast to the often-used 10-item diagnostic criteria from the *DSM-IV*.¹⁷ The isolation of the two items from the *DSM-IV* could lead to misleading results,³⁵ and the item regarding lying about gambling might not be a highly predictive indicator of gambling disorder. Despite such limitations, the prevalence rates of gambling problems reported are largely consistent with previous studies (eg,^{3,4}), suggesting that any potential underestimation is minimal. Lastly, data on characteristics that could have played important roles in the relationship between school contextual factors and gambling, such as parental monitoring, life satisfaction, stressful life events, or coping strategies, would have been useful in the better understanding of the risk factors of adolescent gambling. In contrast, a

major strength of the current study is its large sample of 25,456 adolescents from 58 high schools. This sample provided the sufficient statistical power necessary to examine the understudied problem behavior of adolescent gambling. Secondly, the availability of school contextual factors contributes to the existing literature by acknowledging that the risk of adolescent gambling went beyond individual-level characteristics and that the school environment played a role as well.

CONCLUSION

This study examined patterns of gambling and gambling problems among a large sample of U.S. high school students. Given the ongoing expansion of gambling throughout the state and other states across the country, this work is timely, and findings extend prior research on adolescent gambling by identifying potential school contextual influences. The results indicated that adolescents that are male and report past-month substance use are significantly more likely to report gambling and gambling problems. School-level factors of student suspension rate and percentage of African American students are also negatively associated with gambling.

Acknowledgments

This work was funded in part by grants from the National Institute on Drug Abuse (RO1HD060072) awarded to Silvia Martins, as well as grants from the U.S. Department of Education and William T. Grant Foundation awarded to Catherine Bradshaw. We would like to thank the Maryland State Department of Education and Sheppard Pratt Health System for their support of this research through the Maryland Safe and Supportive Schools Project.

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TABLE 1**Student and school demographic characteristics**

	<i>n</i> (weighted %)	Weighted mean (SD)
Student characteristics (<i>N</i> = 25,456)		
Age		16.0 (1.3)
Male	12,596 (49.7)	
Race		
White/Caucasian	12,810 (54.5)	
Black/African American	7,993 (32.7)	
Hispanic/Latino	1,221 (5.5)	
Asian/Pacific Islander	1,119 (3.9)	
Other	2,312 (3.4)	
Lifetime Gambling		
Lottery	2,085 (8.9)	
Cards or dice	5,028 (19.4)	
Horse or sport bets	2,909 (11.4)	
Casino	1,126 (4.4)	
Slot or poker machines	1,748 (6.9)	
Online	1,647 (6.4)	
Other	3,301 (12.5)	
Any	8,318 (32.8)	
School characteristics (<i>n</i> = 58)		
Student suspension rate (%)		28.0 (15.9)
Student mobility (%)		18.3 (9.8)
% Students receiving free/reduced meals		42.3 (22.5)
% African American students		33.8 (25.0)
Urban	13 (22.4)	
Rural	16 (27.6)	
Sub-urban	29 (50.0)	
Lifetime gambling prevalence		32.4 (4.3)
Lifetime gambling problem prevalence		10.0 (2.2)
Past-month substance use prevalence		41.5 (5.7)

TABLE 2

Correlations among student-level variables

Student-level variables	Gambling	Gambling problems	Alcohol	Cigarette	Marijuana	NMPD ⁺	Age	Male	African American
Lifetime gambling	.33 (.47)								
Lifetime gambling problems	.48*	.10 (.30)							
Past-month alcohol	.23*	.17*	.34 (.48)						
Past-month cigarette	.17*	.17*	.40*	.14 (.34)					
Past-month marijuana	.21*	.19*	.49*	.48*	.21 (.41)				
Past-month NMPD ⁺	.18*	.23*	.31*	.41*	.41*	.09 (.30)			
Age	.07*	.08*	.14*	.16*	.13*	.08*	15.97 (1.29)		
Male	-.22*	-.17*	-.002	-.06*	-.08*	-.04*	-.05*	.50 (.50)	
African American	-.03*	.04*	-.09*	-.11*	.02*	-.02*	.04*	-.004	.33 (.46)

Means and standard deviations (reported in parentheses) are displayed on the diagonal. We conducted collinearity diagnostics and the VIF and tolerance were not elevated, thereby indicating that data are not collinear.

⁺ NMPD, non-medical prescription drug;

* $p < .05$.

TABLE 3

Correlations among school-level variables

School-level variables	Suspension	Mobility	% Free and reduced meals	% African American	Urban	Rural	Gambling problems	Gambling problems	Substance use
Student suspension rate	28.0 (15.9)								
Student mobility rate	.54*	18.3 (9.8)							
% Students receiving free/reduced meals	.20	.19	42.3 (22.5)						
% African American students	.33*	.62*	.06	33.8 (25.0)					
Urban	.15	.48*	-.01	.27*	.22 (.42)				
Rural	-.39*	-.39*	.20	-.37*	-.33*	.28 (.45)			
Lifetime gambling prevalence	-.20	-.22	-.01	-.39*	-.19	.32*	32.4 (4.3)		
Lifetime gambling problem prevalence	.18	.28*	-.14	.18	.01	-.02	.36*	10.0 (2.2)	
Past-month substance use prevalence	.05	-.10	-.11	-.49*	-.001	.18	.43*	.21	41.5 (5.7)

Means and standard deviations (reported in parentheses) are displayed on the diagonal. We conducted collinearity diagnostics and the VIF and tolerance were not elevated, thereby indicating that data are not collinear.

* $p < .05$.

Weighted multilevel results for student- and school-level influences on lifetime gambling, and gambling problems among lifetime gamblers

TABLE 4

Predictor Variables	Lifetime gambling			Any gambling problems among gamblers			
	n (%)			n (%)			
	No (n = 17,136)	Yes (n = 8,318)	AOR	95% CI	No (n = 5,738)	Yes (n = 2,580)	95% CI
Student level							
Age mean (SD)	15.9 (1.2)	16.1 (1.4)	1.03	.98,1.08	16.0 (1.3)	16.3 (1.5)	.99,1.13
Male	7,060 (42.0)	5,536 (65.6)	2.70***	2.51,2.92	3,602 (61.9)	1,934 (73.7)	1.81*** 1.61, 2.04
African American	5,515 (33.7)	2,478 (30.5)	.96	.87,1.05	1,535 (27.0)	943 (38.2)	1.74*** 1.46,2.08
Alcohol	4,514 (26.9)	4,191 (50.1)	2.12***	1.93,2.33	2,674 (46.3)	1,517 (58.4)	1.19 .99,1.44
Cigarette	1,565 (10.0)	1,824 (22.3)	1.13	.96,1.34	1,004 (18.0)	820 (31.9)	1.31*** 1.13,1.51
Marijuana	2,511 (15.3)	2,825 (33.5)	1.42***	1.28,1.58	1,639 (28.4)	1,186 (45.0)	1.18* 1.01,1.38
NMPD	1,008 (5.7)	1,457 (17.2)	1.86***	1.59,2.17	698 (11.6)	759 (29.5)	2.38*** 2.06,2.75
School-level							
Student suspension rate			.998*	.995,1.000			1.002 .998,1.005
Student mobility rate			.999	.991,1.007			1.001 .996,1.007
% Students receiving free and reduced meals			1.001	.998,1.003			1.000 .998,1.001
% African American students			.999*	.997,1.000			1.001 .998,1.003
Urban			1.105	.934,1.192			1.027 .946,1.116
Rural			1.076	.912,1.269			1.008 .998,1.010
Lifetime gambling prevalence			1.006	.998,1.075			.998 .991,1.006
Lifetime gambling problem prevalence			.999	.985,1.013			1.005 .993,1.018
Past-month substance use prevalence			.998	.994,1.003			.997 .988,1.003

Random effect	Variance component	df	χ^2	Variance component	df	χ^2
Student-level	.0932	23639	1963.702***	.1043	6663	1126.266*
School-level	.0244	52	29.794	.0415	52	21.761

* $p < .05$;

.100> p

;10< p
**

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