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Gambling and Problem Behavior Among 14- to 16-Year-Old Boys and Girls in Finland

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Abstract

The aim of this study is to examine the associations between problem behavior and gambling frequency among eighth- and ninth-grade boys and girls (N = 101,167). Data were obtained from the cross-sectional School Health Promotion Study. Outcome measures were adolescents' truancy, bullying, delinquency, and substance use. Polychotomous logistic regression analyses were used to study the relationship between gambling frequency and risk behaviors in a total sample, as well as separately for boys and girls. In 2010, 62% of the adolescents had gambled during the previous year, and in 2011, 61% of the adolescents had done so. Engaging in different levels of truancy, bullying, delinquency, and substance abuse were associated with higher risks for frequent gambling. Similar patterns of associations were found among boys and girls. Adolescents who engaged in gambling on a daily or weekly basis were the most vulnerable group for problem behavior. However, even infrequent gambling was associated with different problem behaviors.

Keywords: gambling, adolescence, problem behavior

Résumé

Cette étude avait pour objectif d'examiner les liens entre les comportements problématiques et la fréquence des activités de jeu compulsif chez les garçons et les filles de 8e et 9e année secondaire (N=101 167). Des données ont été tirées d'une étude transversale de promotion de la santé en milieu scolaire (School Health Promotion Study]. Les absences injustifiées à l'école, l'intimidation, la délinquance et la consommation de substances constituaient les points de mesures de résultats. Des analyses de régression logistique polychotomique ont été réalisées dans un échantillonnage total et de façon distincte chez les garçons et les filles afin de cerner le lien entre la fréquence des activités de jeu de hasard et les comportements à risque. En 2010, 62 % des adolescents avaient participé à des jeux de hasard au cours de l'année précédente. En 2011, ce chiffre était de 61 %. Un lien a été établi entre

l'adoption, à différents degrés, de comportements d'absentéisme injustifié, d'intimidation, de délinquance et de consommation de substances, et l'augmentation du risque de jeu compulsif. Des schémas d'associations semblables ont été relevés chez les garçons et les filles. Les adolescents qui s'adonnaient aux jeux de hasard de façon quotidienne ou hebdomadaire constituaient le groupe le plus à risque de développer des comportements problématiques.

Introduction

Adolescents today are exposed to gambling much earlier than previous generations. Large numbers of different kinds of gambling games are available. These games, such as bingo, lotteries, and casino games, have also made their way into the Internet, providing youth with multiple opportunities to gamble (Potenza et al., 2011). It has been noted that increased availability of gambling is associated not only with more gambling, but also with more gambling-related problems (Hansen & Rossow, 2008; Productivity Commission, 1999).

Gambling often starts at an early age (Gupta & Derevensky, 1997; Rahman et al., 2012). Early onset of gambling can be associated with a more severe gambling profile (Rahman et al., 2012). Typically, the progression from problem-free gambling to problem gambling is rapid for adolescents (Gupta & Derevensky, 1998). Moreover, when compared with adult populations, adolescents are more likely to experience gambling problems (National Gambling Impact Study Commission, 1999; Shaffer, Hall, & Vander Bilt, 1999). It is also hard for adolescents to recognize when gambling becomes problematic or to access mental health professionals for assistance (Griffiths, 2001; Hardoon, Derevensky, & Gupta, 2003; Splevins, Mireskandari, Clayton, & Blaszczynski, 2010).

Although in many societies gambling is generally forbidden for youth younger than 18 years of age, it is a common activity among them. Gambling prevalence studies from Europe (Molde, Pallesen, Bartone, Hystad, & Johnsen, 2009; Luder, Berchtold, Akre, Michaud, & Suris, 2010; Ólason, Skarphedinsson, Jonsdottir, Mikaelsson, & Gretarsson, 2006; Skokauskas & Satkeviciute, 2007), Australia (Splevins et al., 2010), the United States, and Canada (Jacobs, 2000) suggest that 50% to 80% of youth have gambled during the previous year. In Finland, the minimum legal age for gambling was 15 years until the age limit was set to 18 years in October 2010. After a transition period, the new age limit was also applied to slot machines in July 2011. Before July 2011, the prevalence of past-year gambling among adolescents (aged 15 to 17 years) in Finland was 47% (Turja, Halme, Mervola, Järvinen-Tassopoulos, & Ronkainen, 2012).

Adolescence can be a period of experimenting and engaging in risk behaviors (Brener & Collins, 1998): These behaviors are defined as actions that may have a negative influence on an adolescent's life, health, and well-being (Jessor, 1998). On the other hand, risk behavior can manifest as problem behavior in which youth engage in an action that is socially defined as a source of concern or as undesirable by the social and/or legal norms. Different problem behaviors can accumulate: As one form of adolescent problem behavior increases, the likelihood of other problem behavior also increases. This phenomenon is referred as the problem behavior syndrome (Jessor, Donovan, & Costa, 1991). These links between different problem behaviors may be harmful because of their negative influence on an adolescent's growth, life course, and overall health.

Some studies have suggested that gambling is a form of deviant behavior (Barnes, Welte, Hoffman, & Tidwell, 2011; Vitaro, Brendgen, Ladouceur, & Tremblay, 2001). Thus, gambling can be seen as risk behavior associated with different kinds of problem behaviors, such as substance use (Chaumeton, Ramowski, & Nystrom, 2011; Ólason et al., 2006; Yip et al., 2011), truancy (Splevins et al., 2010), serious fighting and carrying a weapon (Potenza et al., 2011; Rahman et al., 2012; Slavin et al., 2013; Yip et al., 2011), and delinquency and criminality (Barnes et al., 2011; Welte, Barnes, Tidwell, & Hoffman, 2009). However, only a few studies have examined these problem behaviors in the same analysis and studied the co-occurrence of gambling and problem behaviors. Furthermore, the assessment of gambling problems has usually been based on diagnostic gambling screens, such as the South Oaks Gambling Screen-Revised for Adolescents and the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; Delfabbro, Lahn, & Grabosky, 2005), although the use of these measurement instruments in adolescents has raised some critique (Stinchfield, 2010). Typically, gambling is measured by dichotomous measures that distinguish gamblers from non-gamblers (or problem gamblers from non-problem gamblers), or, in some studies, by the severity of problem gambling (gamblers are divided into groups on the basis of diagnostic gambling screens; Chaumeton et al., 2011; Potenza et al., 2011; Rahman et al., 2012; Slavin et al., 2013; Yip et al., 2011). In the present study, we are interested in the level of gambling involvement (i.e., gambling frequency). This analysis aims to find signs of possible thresholds for harm associated with gambling. Gambling participation can also be a useful measure when examining gambling behavior and related outcomes, such as the gambler's health and well-being (Rodgers, Caldwell, & Butterworth, 2009).

Gambling and other problem behavior patterns may differ between sexes. For example, substance use is common among both girl and boy gamblers (Chaumeton et al., 2011; Desai, Maciejewski, Pantalon, & Potenza, 2005; Martins, Storr, Ialongo, & Chilcoat, 2008); in contrast, internalizing behaviors (Desai et al., 2005; Martins et al., 2008) are more common among girl gamblers. Different behavior patterns between sexes are also shown among marijuana users, Internet users, and video gamers (Desai, Krishnan-Sarin, Cavallo, & Potenza, 2010; Liu, Desai, Krishnan-Sarin, Cavallo, & Potenza, 2011; Schepis et al., 2011).

Despite many gambling opportunities and the interest of youths in gambling, relatively little is known internationally about adolescent gambling and problem behaviors related to it. To the best of our knowledge, this is the first study conducted in the European context that examines gambling frequency and its associations with different behaviors in the same model among boys and girls. This study also adds knowledge about gambling and its associations with problem behavior at school, such as bullying and truancy. These are important and relevant topics when considering adolescents' well-being. Gambling research involving adolescents is often focused on prevalence and is examined in relation to alcohol use (Blinn-Pike, Worthy, & Jonkman, 2010). Thus, the aim of the present large-scale study is to examine the associations between problem behavior—engagement in truancy, bullying, delinquency, and substance use—and gambling frequency among eighth- and ninth-grade boys and girls.

Method

Participants

Data were obtained from the nationwide School Health Promotion Study (SHPS), which was approved by the ethics committee of Pirkanmaa Hospital District ethical committee of Tampere University Hospital. The SHPS survey is a cross-sectional survey that monitors well-being, health behavior, and school experiences of adolescents in the eighth and ninth grades of lower secondary schools. In Finland, compulsory education starts at the age of 7 years (first grade) and ends at the age of 16 years (ninth grade).

In total, 102,545 students in the eighth and ninth grades participated in the study. Students who had not answered the question concerning gambling frequency (1.3%) were excluded from the study, bringing the total number of participants to 101,167. Of the respondents, 49.8% were eighth graders (mean age = 14.9 years, SD = 0.4) and 50.1% were ninth graders (mean age = 15.9 years, SD = 0.4); 49.5% of the adolescents were boys.

Instruments

Gambling frequency was measured by asking, "How often do you gamble?" The original alternatives were "on 6–7 days per week," "on 3–5 days per week," "on 1–2 days per week," "less than once a week," "less than once a month," and "I have not gambled during the previous year." For the analysis, the first two categories were combined as "on 3–7 days per week."

Problem behavior in adolescents was measured through questions on bullying, truancy, delinquency, and substance use. Bullying was defined as follows: "A pupil is being bullied when another pupil, or a group of pupils, say or do nasty and unpleasant things to him or her. It is also bullying when a pupil is teased repeatedly in a way he or she does not like. But it is not bullying when two pupils of about the same strength or power argue or fight." Pupils were asked, "How often have you bullied other pupils during this semester?" The response scale was "several times a

week," "approximately once a week," "less frequently," and "never." Truancy was asked about with the following question: "How many school days have you missed during the last 30 days because of truancy?" The scale was "none," "1 day," "2–3 days," and "more than 3 days."

In the questionnaire, delinquency was measured with five questions: "Have you done any of the following acts during the last 12 months: written or painted or done graffiti on walls, buses, bus shelters, windows, or similar places?; deliberately damaged or destroyed school property or a school building?; deliberately damaged or destroyed something other than school property?; stolen something from a shop or a stand?; battered someone?" All of the questions were answered on a scale of "no," "once," "2–4 times," and "more than 4 times." Adolescents who had committed at least one of the acts at least once during the last l2 months were considered to have committed delinquent acts. Internal consistency (Cronbach's alpha) for the complete list of delinquent acts was 0.8.

Substance use was examined with questions concerning drinking alcohol, smoking, glue sniffing, using alcohol and medicine simultaneously, using medicine, using snuff, and experimenting with drugs. Alcohol drinking was measured by both frequency of alcohol drinking and drunkenness-related drinking. The question covering the frequency of alcohol drinking was "How often do you use alcohol altogether, e.g., half a bottle of beer or more?" It could be answered by using one of five categories: "I don't drink alcohol," "rarely," "about once a month," "a couple of times a month," or "once a week or more often." The question about the frequency of drunkenness was "How often do you use alcohol until you are really drunk?" It could be answered by using one of four alternatives: "never," "rarely," "1–2 times a month," or "once a week or more often."

Smoking was measured on a scale of "once a day or more often," "once a week or more often (not daily)," "less than once a week," "have quit," and "do not smoke." The use of snuff was measured on a 4-point scale: "never," "tried it once," "occasionally," and "daily." The last two alternatives were combined.

Glue sniffing, simultaneous alcohol and medicine use, and medicine use for intoxicating purposes were measured on a 4-point scale: "never," "once," "2–4 times," and "5 times or more." Experimenting with drugs was measured from the adolescents' answers concerning different kinds of drugs that they had tried at least once. The scale was as follows: "never," "once," "2–4 times," and "5 times or more." Drug types were divided into four categories: (a) marijuana or cannabis; (b) ecstasy; (c) Subutex; and (d) heroin, cocaine, amphetamine, LSD, or other similar drugs. Those adolescents who had experimented with at least one of the drugs at least once were considered to have tried drugs. Internal consistency (Cronbach's alpha) for the complete list of drugs was 0.8.

Response activity for the questions on problem behavior was very good: approximately 1% of the respondents did not answer these questions. This was the case among both boys and girls. Only the question concerning truancy (5.1% in total

sample: 4.9% among boys and 5.3% among girls) and the question about using snuff (1.7% among boys) had higher numbers of missing values.

Procedure

The SHPS is a structured questionnaire that is completed during a school lesson under the supervision of a teacher. Answering is anonymous and voluntary. Confidentiality is ensured by having all questionnaires per classroom enclosed in an envelope and directing them to the SHPS research group. Those students who are absent on the day of the survey are not contacted afterwards.

Since 2002, the SHPS has been conducted in two parts: in even-numbered years in Southern Finland, Eastern Finland, and Lapland and in odd-numbered years in Western Finland, Oulu, and Åland. The present study consists of data from the years 2010 and 2011, thus covering all of Finland. Rather than being a sample, the current data comprised practically all of the student population in the areas studied and all students had equal probability (nearly 100% probability) of being included in the data set. Overall, the school context acts mainly as a convenient means for reaching the adolescents. In 2010, data collection covered 78% of Finnish eighth and ninth graders in the studied regions, and in 2011, it covered 81% of these students.

Of note is that in 2010, the minimum legal age for gambling was 15 years, and in 2011, the age limit was 18 years for all gambling forms other than playing slot machines.

Data Analysis

The main interest in this study was the five-category gambling frequency indicator. The last category, "I have not gambled during the previous year," was chosen as the reference category for the analysis. The associations of gambling frequency with outcome measures were studied by using polychotomous logistic regression. First, we examined these relationship in a total sample in which sex and grade were adjusted, and then we examined them separately for boys and girls in which grade was adjusted. Polychotomous logistic regression is useful for situations in which subjects may be classified on the basis of values in a set of predictor variables. This statistical method was used to facilitate analyses of differences between classes in more detail. Given the size of the data set, this choice produced more in-depth information on the relationships between the predictor and outcome variables.

In Model 1, the predictor variables were entered into the model one at a time. Thus, Model 1 contained only one problem behavior variable and the adjusted variables sex and grade level. In Model 2, all predictor variables were included in the model at the same time. In this model, sex and grade level were again adjusted. When we examined associations among boys and girls, the grade level was adjusted. A statistically significant overall relationship was found between the combination of independent variables and the dependent variable, and there was no evidence of numerical problems in the models. Analysis of residuals did not result in exclusion

of cases from the data set. Moreover, the classification accuracy surpassed the proportional by chance accuracy criteria, supporting the utility of the model (Schwab, 2006). The statistical analyses were conducted by using IBM SPSS Statistics 20. Results are presented as odds ratios (ORs) and 95% confidence intervals.

Results

Gambling

In 2010, 62% of adolescents had gambled during the previous year, and in 2011, 61% of adolescents had done so. In both grade levels, boys gambled more often than girls (Table 1). For both sexes, weekly gambling was most common in the ninth grade. The risk of gambling on 1–2 days a week was 8 times as high among boys as among girls and 1.6 times as high among ninth graders as among eighth graders.

Problem Behaviour

Of the respondents, 4.1% of girls and 4.5% of boys had missed three or more school days because of truancy, and 1.3% of girls and 4.5% of boys had bullied someone several times a week. As many as 22.9% of boys had committed delinquent acts during the previous year. For girls, the percentage was 18.1 (Table 1).

Daily smoking occurred in 13.6% of girls and 16.3% of boys, and 15.5% of boys used snuff at least occasionally. Using snuff was less common among girls: Only 2.6% used it at least occasionally. In addition, 5.9% of girls and 7.7% of boys used alcohol at least once a week. Among girls, 2.2% used alcohol to get drunk once a week or more often, and 3.5% of boys did so.

Sniffing glue had been tried at least once by 5.4% of girls and 4.6% of boys. For girls, 6.1% had used alcohol and medicine simultaneously and 3.6% of them had used medicine for intoxicating purposes at least once. For boys, the percentages were 2.9% for simultaneous use of alcohol and medicine and 1.7% for using medicine for intoxicating purposes. In addition, 6.6% of girls and 9.3% of boys had tried drugs at least once.

Associations between Gambling Frequency and Problem Behavior

In the model with the total sample in which grade level and sex were adjusted (Model 1), the risks for truancy, bullying, delinquency, and substance use increased with the increase in frequency of gambling. Overall, even the lowest gambling frequency, gambling less often than monthly, was associated with problem behaviors. Those who had gambled during the previous year had a higher risk of problem behavior than did those who had not gambled. For example, the risk for committing delinquent acts for those who gambled on 3–7 days was 13 times as high as it was for those who had not gambled. Additionally, the OR for smoking daily

Table 1
Frequency and Proportions (%) of Gambling and Problem Behavior According to Sex and Grade Level

Gambling and problem behaviors	Boys		Girls		Combined
	8th grade	9th grade	8th grade	9th grade	8th and 9th grades
Gambling frequency	n (%)	n (%)	n (%)	n (%)	N (%)
On 3-7 days a week	3922 (15.6)	4427 (17.5)	465 (1.8)	510 (2.0)	9324 (9.2)
On 1-2 days a week	4564 (18.1)	5427 (21.4)	694 (2.8)	868 (3.4)	11553 (11.4)
Less than 1x a week	5424 (21.6)	6441 (25.4)	1941 (7.7)	2627 (10.3)	16433 (16.2)
Less than 1x a month	5561 (22.1)	5416 (21.4)	6332 (25.1)	8337 (32.7)	25646 (25.4)
Not during this year	5691 (22.6)	3618 (14.3)	15747 (62.5)	13155 (51.6)	38211 (37.8)
Problem behavior					
Truancy					
Over 3 days	932 (3.9)	1223 (5.1)	873 (3.7)	1101 (4.5)	4129 (4.3)
2-3 days	798 (3.4)	1270 (5.0)	1113 (4.7)	1447 (6.0)	4628 (4.8)
1 day	2083 (8.7)	2656 (11.0)	2756 (11.6)	3236 (13.4)	10731 (11.2)
Never	19996 (84.0)	19039 (78.7)	19051 (80.1)	18414 (76.1)	76500 (79.7)
Bullying					
Several times a week	1058 (4.2)	1219 (4.8)	315 (1.3)	327 (1.3)	2919 (2.9)
Approx. 1x a week	1418 (5.7)	1516 (6.0)	624 (2.5)	599 (2.4)	4157 (4.1)
Less frequently	10464 (41.7)	10261 (40.6)	6823 (27.1)	6663 (26.2)	34211 (33.9)
Never	12131 (48.4)	12247 (48.5)	17369 (69.1)	17862 (70.2)	59609 (59.1)
Delinquency					
Yes	5675 (22.6)	5865 (23.2)	4717 (18.7)	4445 (17.5)	20712 (20.5)
No	19453 (77.4)	19429 (76.8)	20451 (81.3)	21030 (82.5)	80363 (79.5)
Smoking					
1x a day or more	3231 (13.0)	4908 (19.6)	2727 (10.9)	4102 (16.2)	14968 (14.9)
1x a week or more, not daily	950 (3.8)	1216 (4.9)	1086 (4.3)	1410 (5.6)	4662 (4.7)
Less than 1x a week	1442 (5.8)	1885 (7.5)	2154 (8.6)	2768 (10.9)	8249 (8.2)
Have quit	3780 (15.2)	3765 (15.0)	3118 (12.5)	3529 (13.9)	14192 (14.2)
Do not smoke	15462 (62.2)	13244 (52.9)	15900 (63.6)	13502 (53.3)	58108 (58.0)
Using snuff					
Daily	668 (2.7)	1199 (4.8)	93 (0.4)	120 (0.5)	2080 (2.1)
Occasionally	2154 (8.7)	3667 (14.7)	379 (1.5)	691 (2.7)	6891 (6.9)
Tried it once	2226 (9.0)	2677 (10.7)	1185 (4.8)	2109 (8.3)	8197 (8.2)
Never	19607 (79.5)	17410 (69.8)	23254 (93.3)	22371 (88.5)	82642 (82.8)
Alcohol drinking					
1x a week or more	1462 (5.9)	2395 (9.5)	1137 (4.5)	1860 (7.3)	6854 (6.8)
A couple of times per month	2912 (11.7)	5035 (20.1)	3494 (13.6)	5344 (21.0)	16684 (16.6)
Approx. 1x a month	2037 (8.2)	3042 (12.1)	2509 (10.0)	3513 (13.8)	11101 (11.1)
Less often	5468 (22.0)	5705 (22.7)	5566 (22.2)	5972 (23.5)	22711 (22.6)
Do not use	12934 (52.1)	8923 (35.6)	12427 (49.6)	8711 (34.3)	42995 (42.8)
Drunkenness-related drinking					
1x a week or more	682 (2.8)	1051 (4.2)	465 (1.9)	651 (2.6)	2849 (2.8)
Approx. 1-2x per month	2077 (8.4)	3819 (15.2)	2556 (10.2)	4135 (16.3)	12587 (12.6)
Less often	5458 (22.0)	7686 (30.7)	5804 (23.2)	8190 (32.3)	27138 (27.1)
Never	16547 (66.8)	12489 (49.9)	16190 (64.7)	12395 (48.9)	57621 (57.5)
Alcohol and medicine for intoxication					
5x or more	480 (1.9)	598 (2.4)	392 (1.6)	505 (2.0)	1975 (2.0)
2-4 times	329 (1.3)	475 (1.9)	728 (2.9)	968 (3.8)	2500 (2.5)
Once	701 (2.8)	755 (3.0)	1308 (5.2)	1763 (6.9)	4527 (4.5)
Never	23455 (94.0)	23315 (92.7)	22637 (90.3)	22156 (87.3)	91563 (91.0)

Table 1. Continued.

Gambling and problem behaviors	Boys		Girls		Combined
	8th grade	9th grade	8th grade	9th grade	8th and 9th grades
Medicine for intoxication					
5x or more	413 (1.7)	507 (2.0)	391 (1.6)	460 (1.8)	1771 (1.8)
2-4 times	242 (1.0)	285 (1.1)	603 (2.4)	645 (2.5)	1775 (1.8)
Once	385 (1.5)	487 (1.9)	869 (3.5)	936 (3.7)	2677 (2.7)
Never	23909 (95.8)	23839 (94.9)	23179 (92.6)	23323 (92.0)	94250 (93.8)
Glue sniffing					
5x or more	451 (1.8)	522 (2.1)	316 (1.3)	276 (1.1)	1565 (1.6)
2-4 times	396 (1.6)	428 (1.7)	699 (2.8)	538 (2.1)	2061 (2.1)
Once	1195 (4.8)	1108 (4.4)	1409 (5.6)	1296 (5.1)	5008 (5.0)
Never	22915 (91.8)	23075 (91.8)	22634 (90.3)	23271 (91.7)	91895 (91.4)
Drugs					
At least once	1745 (7.0)	2935 (11.7)	1109 (4.7)	2159 (8.5)	8029 (8.0)
Never	23221 (93.0)	22197 (88.3)	23874 (95.3)	23228 (91.5)	92520 (92.0)

was 45 and for drinking alcohol weekly was 86 among adolescents who gambled on 3–7 days (Table 2).

In the model with the total sample in which all predictor variables were included at the same time (Model 2), the associations between gambling and truancy, bullying, delinquency, smoking, using snuff, alcohol drinking, drunkenness-related drinking, and glue sniffing remained significant; however, the ORs for each problem behavior were reduced. For example, the risk for committing delinquent acts for those who gambled on 3–7 days was 2.5 times as high as for those who did not gamble. The OR for smoking among those who gambled 3–7 times a week was 4.1 for daily smoking in comparison to those who did not gamble. The risk for problem behaviors was significant even at the lowest gambling frequency. For instance, the OR for drinking alcohol a couple of times a month among those who gambled less often than monthly was 2.1 in comparison to those who did not gamble. The risk for truancy was statistically significant only among weekly gamblers (Table 2).

For boys and girls, the risks for truancy, delinquency, and substance use increased when gambling frequency increased in Model 1. The risk was statistically significant even among boys and girls who gambled less often than monthly. However, the risk for medicine use for intoxicating purposes was statistically significant only among boys who gambled monthly or weekly. This was also the case for bullying among girls. For girls, the risk of bullying increased when all other problem behaviors were taken into account (Model 2). Among boys, gambling appeared to be a protective factor for bullying in Model 1, but in Model 2, the risk for bullying was higher among gamblers.

As in the total sample, truancy, bullying, delinquency, smoking, using snuff, alcohol drinking, drunkenness-related drinking, and glue sniffing among

Table 2

Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Sex, Grade Level, and Involvement in Problem Behavior among 14- to 16-Year-Old Adolescents (N=101,167) in Relation to Gambling Frequency

Characteristics and problem behaviors	*N* (%)	Gambling frequency: Less than monthly OR (CI)		Less than weekly		1-2 days per week		3-7 days per week	
Sex									
Boys	50491 (49.9)	**26.6 (24.8-28.5)**		**19.9 (18.7-21.0)**		**8.1 (7.7-8.4)**		2.3 (2.2-2.4)	
Girls	50676 (50.1)	1.0		1.0		1.0		1.0	
Grade level									
8th grade	50826 (50.2)	**0.7 (0.6-0.7)**		**0.6 (0.6-0.7)**		**0.6 (0.6-0.7)**		**0.7 (0.7-0.7)**	
9th grade	50341 (49.8)	1.0		1.0		1.0		1.0	
Problem behavior		Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Truancy									
Over 3 days	4129 (4.3)	**2.0 (1.8-2.2)**	0.9 (0.8-1.0)	**3.4 (3.1-3.9)**	1.0 (0.8-1.1)	**5.5 (4.9-6.2)**	1.1 (0.9-1.2)	**19.0 (17.0-21.3)**	**1.7 (1.5-2.0)**
2-3 days	4628 (4.8)	**1.8 (1.6-1.9)**	0.9 (0.8-1.0)	**2.8 (2.6-3.1)**	1.0 (0.9-1.1)	**4.7 (4.2-5.2)**	**1.3 (1.1-1.5)**	**7.7 (6.9-8.6)**	**1.5 (1.3-1.7)**
1 day	10731 (11.2)	**1.7 (1.6-1.8)**	1.1 (1.0-1.1)	**2.4 (2.2-2.6)**	1.1 (1.0-1.2)	**3.6 (3.3-3.9)**	**1.4 (1.3-1.5)**	**4.4 (4.1-4.8)**	**1.4 (1.2-1.5)**
None	76500 (79.7)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Bullying									
Several times a week	2919 (2.9)	**1.9 (1.6-2.2)**	0.9 (0.8-1.1)	**4.0 (3.5-4.7)**	**1.3 (1.1-1.6)**	**6.2** (5.3-7.3)	**1.4 (1.2-1.7)**	**25.8** (22.4-29.7)	**2.6 (2.2-3.1)**
Approx. once a week	4157 (4.1)	**2.2 (2.0-2.4)**	**1.3 (1.2-1.5)**	**3.5 (3.1-3.9)**	**1.5 (1.4-1.7)**	**5.3** (4.7-5.9)	**1.8 (1.6-2.1)**	**9.2** (8.2-10.3)	**2.2 (1.9-2.5)**
Less frequently	34211 (33.9)	**1.8 (1.8-1.9)**	**1.3 (1.3-1.4)**	**2.6 (2.5-2.7)**	**1.6 (1.5-1.7)**	**3.1** (3.0-3.3)	**1.7 (1.6-1.8)**	**3.6** (3.4-3.8)	**1.8 (1.7-1.9)**
Never	59609 (59.1)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Delinquency									
Yes	20712 (20.5)	**2.4** (2.3-2.5)	**1.4** (1.3-1.5)	**4.1** (3.9-4.3)	**1.7** (1.6-1.8)	**6.2** (5.8-6.5)	**1.9 (1.8-2.1)**	**13.2** (12.4-14.0)	**2.5 (2.3-2.7)**
No	80363 (79.5)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Smoking									
1x a day or more	14968 (14.9)	**3.9 (3.7-4.2)**	**1.8 (1.6-1.9)**	**10.0 (9.4-10.7)**	**2.8 (2.5-3.0)**	**20.0 (18.6-21.6)**	**3.6 (3.2-3.9)**	**45.4 (42.0-49.1)**	**4.1 (3.7-4.6)**
1x a week or more, not daily	4662 (4.7)	**2.9 (2.7-3.2)**	**1.4 (1.3-1.6)**	**6.2 (5.6-6.9)**	**2.0 (1.8-2.3)**	**9.4 (8.4-10.5)**	**2.1 (1.8-2.4)**	**15.1 (13.4-17.0)**	**2.3 (2.0-2.7)**
Less than 1x a week	8249 (8.2)	**2.6 (2.4-2.7)**	**1.3 (1.2-1.4)**	**4.3 (4.0-4.6)**	**1.6 (1.5-1.7)**	**6.2 (5.6-6.7)**	**1.7 (1.5-1.9)**	**7.7 (6.9-8.5)**	**1.6 (1.4-1.8)**
Have quit	14192 (14.2)	**2.2 (2.1-2.3)**	**1.4 (1.3-1.4)**	**3.3 (3.1-3.5)**	**1.6 (1.5-1.7)**	**4.2 (3.9-4.5)**	**1.7 (1.5-1.8)**	**5.6 (5.2-6.1)**	**1.8 (1.6-2.0)**
Do not smoke	58108 (58.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Table 2. Continued.

Characteristics and problem behaviors	*N* (%)	Gambling frequency							
		Less than monthly OR (CI)		Less than weekly		1-2 days per week		3-7 days per week	
Using snuff									
Daily or occasionally	8971 (9.0)	**3.3 (2.9-3.7)**	**1.5 (1.3-1.7)**	**7.8 (7.0-8.7)**	**2.2 (1.9-2.4)**	**13.2 (11.9-14.8)**	**2.6 (2.3-2.9)**	**28.3 (25.4-32.6)**	**3.3 (2.9-3.7)**
Tried it once	8197 (8.2)	**2.8 (2.6-3.0)**	**1.4 (1.3-1.6)**	**4.8 (4.4-5.2)**	**1.7 (1.6-1.9)**	**6.8 (6.3-7.4)**	**2.0 (1.8-2.2)**	**8.8 (8.0-9.6)**	**2.0 (1.8-2.3)**
Never	82642 (82.8)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Alcohol drinking									
1x a week or more often	6854 (6.8)	**4.2 (3.8-4.6)**	**1.9 (1.7-2.2)**	**11.5 (10.5-12.7)**	**2.7 (2.3-3.1)**	**26.3 (23.7-29.3)**	**3.8 (3.2-4.5)**	**86.1 (77.4-95.8)**	**4.4 (3.7-5.3)**
A couple of times per month	16684 (16.6)	**4.1 (3.9-4.4)**	**2.2 (2.0-2.4)**	**9.7 (9.1-10.4)**	**3.1 (2.8-3.4)**	**18.7 (17.4-20.2)**	**4.4 (3.9-4.9)**	**28.2 (26.0-30.6)**	**4.5 (3.9-5.1)**
Approx. 1x a month	11101 (11.1)	**3.5 (3.3-3.7)**	**2.2 (2.0-2.3)**	**7.2 (6.7-7.7)**	**3.0 (2.7-3.3)**	**11.7 (10.7-12.7)**	**3.9 (3.5-4.4)**	**14.7 (13.3-16.1)**	**3.8 (3.3-4.3)**
Less often	22711 (22.6)	**2.7 (2.6-2.8)**	**2.1 (1.9-2.2)**	**4.3 (4.0-4.5)**	**2.6 (2.4-2.8)**	**5.7 (5.4-6.1)**	**3.1 (2.9-3.4)**	**6.1 (5.6-6.6)**	**2.9 (2.6-3.2)**
Do not use	42995 (42.8)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Drunkenness-related drinking									
1x a week or more often	2849 (2.8)	**3.3 (2.8-3.8)**	1.0 (0.8-1.2)	**8.9 (7.6-10.5)**	1.1 (0.9-1.4)	**22.9 (19.5-27.0)**	**1.3 (1.1-1.7)**	**127.3(109.5-148.0)**	**2.1 (1.7-2.7)**
Approx. 1 - 2x per month	12587 (12.6)	**3.6 (3.4-3.8)**	**1.2 (1.1-1.3)**	**8.4 (7.9-9.0)**	**1.4 (1.2-1.6)**	**16.2 (15.0-17.5)-**	**1.5 (1.3-1.7)**	**29.4 (27.1-32.0)**	**1.6 (1.4-1.8)**
Less often	27138 (27.1)	**2.9 (2.8-3.0)**	**1.2 (1.1-1.3)**	**5.3 (5.0-5.5)**	**1.4 (1.3-1.5)**	**8.0 (7.6-8.5)**	**1.5 (1.3-1.6)**	**10.2 (9.5-10.9)**	**1.5 (1.3-1.6)**
Never	57621 (57.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Alcohol and medicine for intoxication									
5x or more	1975 (2.0)	**1.9 (1.7-2.3)**	0.8 (0.6-1.0)	**3.5 (3.0-4.2)**	0.8 (0.7-1.0)	**6.5 (5.4-7.9)**	0.9 (0.7-1.2)	**35.2 (30.1-41.3)**	0.9 (0.7-1.2)
2-4 times	2500 (2.5)	**2.7 (2.4-3.0)**	1.1 (0.9-1.2)	**4.8 (4.2-5.4)**	1.1 (1.0-1.3)	**6.3 (5.4-7.4)**	1.0 (0.8-1.2)	**13.3 (11.5-15.5)**	1.0 (0.8-1.2)
One time	4527 (4.5)	**2.3 (2.2-2.5)**	1.1 (1.0-1.2)	**3.8 (3.4-4.2)**	1.1 (1.0-1.3)	**5.3 (4.8-6.0)**	1.1 (1.0-1.3)	**9.4 (8.4-10.6)**	1.1 (1.0-1.3)
Never	91563 (91.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Table 2. Continued.

Characteristics and problem behaviors	*N* (%)	Gambling frequency							
		Less than monthly OR (CI)		Less than weekly		1-2 days per week		3-7 days per week	
Medicine for intoxication									
5x or more	1771 (1.8)	**1.6 (1.3-1.9)**	0.8 (0.7-1.0)	**2.4 (1.9-2.8)**	0.7 (0.6-1.0)	**4.3 (3.6-5.3)**	0.8 (0.6-1.1)	**28.2 (24.0-33.0)**	1.4 (1.0-1.7)
2-4 times	1775 (1.8)	**2.0 (1.8-2.3)**	0.9 (0.8-1.1)	**3.1 (2.6-3.6)**	0.9 (0.7-1.1)	**4.1 (3.4-4.9)**	0.8 (0.7-1.0)	**8.8 (7.4-10.4)**	0.9 (0.7-1.1)
One time	2677 (2.7)	**1.8 (1.6-2.0)**	0.9 (0.8-1.0)	**2.6 (2.3-3.0)**	0.9 (0.8-1.0)	**3.3 (2.9-3.9)**	**0.8 (0.7-0.9)**	**6.6 (5.7-7.6)**	0.9 (0.7-1.1)
Never	94250 (93.8)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Glue sniffing									
5x or more	1565 (1.6)	**1.8 (1.4-2.1)**	1.0 (0.8-1.2)	**2.9 (2.4-3.6)**	0.9 (0.7-1.2)	**4.4 (3.5-5.5)**	0.8 (0.6-1.1)	**33.3 (27.9-39.9)**	**1.8 (1.4-2.3)**
2-4 times	2061 (2.1)	**2.4 (2.1-2.7)**	1.2 (1.0-1.4)	**3.4 (3.0-4.0)**	1.1 (0.9-1.2)	**5.4 (4.6-6.3)**	1.2 (1.0-1.5)	**10.9 (9.3-12.7)**	**1.4 (1.1-1.7)**
One time	5008 (5.0)	**2.0 (1.8-2.1)**	1.1 (1.0-1.3)	**3.1 (2.8-3.4)**	**1.2 (1.1-1.4)**	**4.2 (3.7-4.6)**	**1.3 (1.2-1.5)**	**6.6 (5.9-7.3)**	**1.4 (1.2-1.6)**
Never	91895 (91.4)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Drugs									
At least once	8029 (8.0)	**2.3 (2.2-2.5)**	0.9 (0.8-1.0)	**4.1 (3.7-4.4)**	0.9 (0.8-1.0)	**6.5 (6.0-7.1)**	0.9 (0.8-1.0)	**16.8 (15.4-18.3)**	1.0 (0.9-1.1)
Never	92520 (92.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Note. The reference category for the dependent variable was "I have not gambled during the previous year." Numbers in bold are statistically significant ($p \leqslant .05$). In Model 1, predictor variables were entered into the model one at a time. In Model 2, all predictor variables were included in the model at the same time. In both models, sex and grade level were adjusted.

boys and girls remained statistically significant in Model 2. Gambling monthly or on 1–2 days per week appeared to be a protective factor for medicine use for intoxication among boys. Drunkenness-related drinking was not statistically significantly more common among girls who gambled on 3–7 days per week.

Discussion

This large-scale study examined gambling frequency and problem behavior among Finnish eighth- and ninth-grade boys and girls. Based on our results, the more frequent the gambling, the higher the ORs for a range of problem behaviors. This pattern of associations was found among both boys and girls. Adolescents who engaged in gambling on a daily or weekly basis were the most vulnerable group for problem behaviors. However, even infrequent gambling was associated with different problem behaviors.

As in previous studies, this research showed that gambling is a relatively common activity among adolescents (Luder et. al, 2010; Shaffer et al., 1999; Slepvins et al., 2010). In 2010, 62% of adolescents had gambled during the previous year, and in 2011, 61% of adolescents had done so. In addition, as in other studies, gambling was significantly higher among boys than among girls (Barnes et al., 2011; Blinn-Pike et al., 2010).

Furthermore, our findings revealed that gambling behavior in young people is related to substance use. Risk of smoking, using snuff, alcohol drinking, drunkenness-related drinking, glue sniffing, using alcohol and medicine simultaneously, using medicine, and experimenting with drugs increased with the increase in frequency of gambling. An association between gambling and substance use has also been indicated in previous studies (Chaumeton et al., 2011; Ólason et al., 2006; Potenza et al., 2011; Rahman et al., 2012; Yip et al., 2011). When examining these associations by sex, we discovered that gambling and substance use were related among both boys and girls. Similarly, other studies have found a co-occurrence in substance use and gambling among both boys and girls (Chaumeton et al., 2011; Desai et al., 2005; Martins et al., 2008).

Gambling was also related to truancy and delinquency. These findings are consistent with those from a study by Splevins et al. (2010), who found that compared with non-problem gamblers, problem gamblers were more likely to have missed school because of gambling. In addition, these findings are consistent with those of Welte et al. (2009), who discovered that problem gambling co-occurred with substance use and conduct disorders. Interestingly, our findings also revealed that those who gambled more often were more involved in bullying. However, among boys, gambling seemed to be a protective factor, but when all problem behaviors were taken into account, the risk for bullying increased with gambling involvement. Moreover, girls' risk for bullying increased in the model that contained all problem behaviors. To the best of our knowledge, this was the first study to examine gambling and its association with bullying.

When examining the co-occurrence of gambling and other problem behaviors (Model 2), we found that truancy, bullying, delinquency, smoking, using snuff, alcohol drinking, drunkenness-related drinking, and glue sniffing remained significant. In line with our results, those of Slavin and colleagues (2013) showed that adolescents defined as low-risk gamblers or at-risk/problem gamblers who were involved in serious physical fighting were more likely than non-gamblers to report smoking and lifetime alcohol consumption. Co-occurrence of gambling, delinquency, and substance use has been demonstrated in other studies as well (Barnes, Welte, Hoffman, & Dintcheff, 2005; Barnes et al., 2011; Vitaro et al., 2001). To extend research on gambling and problem behaviors, we also investigated these relations among boys and girls separately and in different gambling frequencies. Our study revealed strong associations between gambling and problem behaviors among both sexes. Furthermore, although many prior studies have concentrated on problem gamblers, this study showed that even less frequent gambling may be associated with various problem behaviors.

The associations between problem behavior indicators and gambling remained significant even after all predictor variables were taken into account. The discovery that the ORs decreased in this model is evidence of shared variance in all of these behaviors, which supports the idea that gambling and several other behaviors are part of the same phenomenon: problem behavior syndrome (Barnes et al., 2011; Jessor, 1998; Vitaro et al., 2001). This suggests that involvement in some problem behaviors increases the likelihood of involvement in other problem behaviors, as our study demonstrated. This phenomenon could be explained by common risk factors for these problem behaviors. Although the nature of these associations is undetermined, studies have examined impulsivity, parental supervision, deviant friends, and moral disengagement as shared predictors of adolescent gambling and problem behaviors (Barnes et al., 2005, 2011; Leeman, Hoff, Krishnan-Sarin, Patock-Peckham, & Potenza, 2014; Vitaro et al., 2001; Wanner, Vitaro, Charbonneau, & Tremblay, 2009). Furthermore, pubertal status and sensation seeking may play a role in these deviant behaviors, as shown in the case of substance use (Kong et al., 2013).

Limitations

Some limitations in this study should be taken into consideration. The information was gathered by self-reports, and thus we cannot exclude the possibility of over- or underreporting. This possibility may be noticed particularly among adolescents (Brener, Billy, & Grady, 2003). The cross-sectional study design prevents us from drawing causal conclusions about the behaviors; as such, further research is needed in which longitudinal data are used to determine the temporal relationship between gambling frequency and problem behaviors.

Of note is that the final sample may not cover those who gamble the most and engage most in problem behavior. As a non-response is often associated with different types of problems (Pietilä, Rantakallio, & Läärä, 1995), the estimates for gambling

frequency and problem behaviors may be underestimated. This is especially true in the case of truancy. Because the surveys were conducted in the classroom, it is likely that we undersampled those who have the greatest tendency not to be in class. On the other hand, the survey is based on a large and representative sample of Finnish eighth- and ninth-grade students.

Furthermore, the SHPS survey was not specific to gambling. The data contained one item that measured gambling, embedded within a large survey covering questions about health, health behavior, and school experiences of adolescents. The survey did not contain a validated problem gambling screen. However, as our goal was not to identify problem gamblers, but to study gambling involvement in the adolescent population and its associations with problem behaviors, we felt that there was no need for validated problem gambling screens. In the field of gambling research, criticism has been voiced concerning commonly used instruments to screen for adolescents' gambling screening instruments (Stinchfield 2010). The survey neither collected information on money spent on gambling or on gambling types (e.g., slot machines, lottery). In addition, the question concerning gambling did not explain what is meant by gambling. Thus, adolescents may interpret gambling in different ways.

Conclusions

Our study provided information about adolescent gambling as a risk behavior. Significant associations that were found between gambling and numerous problem behaviors should be taken into consideration when designing prevention and treatment programs. Our findings also emphasize the need for further study of adolescent gambling. More research is warranted on possible shared risk factors associated with gambling and problem behavior.

Because gambling and problem behaviors co-occur, it is important to increase awareness and education concerning adolescents' gambling. This perspective on public health should target the entire population, not only those who gamble the most. Underage gambling cannot be tackled by national regulation alone. It would be beneficial to give guidance to teachers, social workers, and health professionals about the possible risk associated with gambling. Furthermore, educational prevention programs for students should be arranged and information materials should be made easily available to them.

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Appendix A

Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Involvement in Problem Behavior among 14- to 16-Year-Old Boys (N = 50,491) in Relation to Gambling Frequency

Grade and problem behaviors	*N* (%)	Gambling frequency among boys							
		Less than monthly		Less than weekly		On 1-2 days per week		On 3-7 days per week	
Grade level									
8th grade	25162 (49.8)	**0.6 (0.6-0.7)**		**0.5 (0.5-0.6)**		**0.5 (0.5-0.6)**		**0.6 (0.5-0.6)**	
9th grade	25329 (50.2)	1.0		1.0		1.0		1.0	
Problem behavior		**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Truancy									
Over 3 days	2155 (4.5)	1.2 (1.0-1.5)	0.8 (0.6-1.0)	**1.9 (1.6-2.3)**	0.8 (0.6-1.0)	**3.0 (2.4-3.6)**	0.9 (0.7-1.1)	**10.5 (8.8-12.5)**	**1.4 (1.2-1.8)**
2-3 days	2068 (4.3)	1.3 (1.0-1.5)	0.8 (0.7-1.0)	**1.9 (1.6-2.3)**	0.9 (0.7-1.1)	**3.6 (3.0-4.2)**	1.2 (1.0-1.5)	**6.0 (5.0-7.1)**	**1.5 (1.2-1.8)**
1 day	4739 (9.9)	**1.4 (1.3-1.6)**	1.0 (0.9-1.1)	**2.0 (1.8-2.2)**	1.0 (0.9-1.2)	**3.1 (2.8-3.3)**	**1.4 (1.2-1.5)**	**3.9 (3.5-4.4)**	**1.4 (1.2-1.5)**
None	39035 (81.3)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Bullying									
Several times a week	2277 (4.5)	**0.7 (0.6-0.8)**	1.1 (0.9-1.4)	**0.5 (0.5-0.6)**	1.3 (1.0-1.6)	**0.6 (0.5-0.7)**	1.3 (1.0-1.6)	**1.7 (1.5-1.9)**	**2.3 (1.9-2.9)**
Approx.1x a week	2934 (5.8)	**0.8 (0.7-0.9)**	**1.5 (1.2-1.8)**	**0.6 (0.5-0.7)**	**1.7 (1.4-2.0)**	**0.5 (0.5-0.6)**	**1.9 (1.6-2.3)**	**0.6 (0.6-0.7)**	**2.4 (2.0-2.8)**
Less frequently	20725 (41.2)	1.0 (0.9-1.0)	**1.5 (1.4-1.6)**	**0.9 (0.8-0.9)**	**1.8 (1.7-1.9)**	**0.8 (0.8-0.9)**	**1.9 (1.7-2.0)**	**0.8 (0.8-0.9)**	**1.9 (1.8-2.1)**
Never	24378 (48.5)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Delinquency									
Yes	11540 (22.9)	**1.9 (1.7-2.1)**	**1.3 (1.2-1.5)**	**3.2 (2.9-3.5)**	**1.6 (1.4-1.8)**	**5.0 (4.6-5.4)**	**1.9 (1.7-2.1)**	**10.7 (9.8-11.6)**	**2.5 (2.2-2.7)**
No	38882 (77.1)	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**
Smoking									
1x a day or more	8139 (16.3)	**2.2 (2.0-2.5)**	1.2 (1.0-1.4)	**5.1 (4.6-5.8)**	**1.6 (1.4-1.9)**	**10.3 (9.2-11.6)**	**2.1 (1.8-2.4)**	**24.1 (21.4-27.1)**	**2.5 (2.2-3.0)**
1x a week or more, not daily	2166 (4.3)	**2.4 (1.9-2.9)**	1.2 (0.9-1.5)	**4.6 (3.8-5.6)**	**1.5 (1.2-1.8)**	**7.5 (6.2-9.1)**	**1.6 (1.3-2.0)**	**12.4 (10.2-15.0)**	**1.8 (1.5-2.3)**
Less than 1x a week	3327 (6.7)	**2.7 (2.3-3.2)**	**1.5 (1.2-1.8)**	**5.1 (4.4-5.9)**	**1.8 (1.5-2.2)**	**7.6 (6.5-8.8)**	**2.0 (1.7-2.4)**	**9.6 (8.2-11.3)**	**2.0 (1.6-2.4)**
Have quit	7545 (15.1)	**2.1 (1.9-2.3)**	**1.4 (1.3-1.6)**	**3.2 (2.9-3.5)**	**1.6 (1.4-1.8)**	**4.1 (3.7-4.5)**	**1.7 (1.5-1.9)**	**5.5 (5.0-6.0)**	**1.9 (1.6-2.1)**
Do not smoke	28706 (57.5)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Using snuff									
Daily or occasionally	7688 (15.5)	**2.9 (2.5-3.3)**	**1.7 (1.5-2.0)**	**6.6 (5.7-7.6)**	**2.6 (2.2-3.0)**	**10.8 (9.4-12.4)**	**2.9 (2.4-3.4)**	**21.7 (19.0-24.8)**	**3.4 (2.9-4.0)**
Tried it 1x	4903 (9.9)	**2.9 (2.6-3.4)**	**1.9 (1.6-2.3)**	**4.9 (4.2-5.6)**	**2.4 (2.0-2.8)**	**6.8 (6.0-7.8)**	**2.6 (2.2-3.0)**	**8.7 (7.6-10.0)**	**2.6 (2.2-3.1)**
Never	37017 (74.6)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Appendix A. Continued.

Grade and problem behaviors	*N* (%)	Gambling frequency among boys							
		Less than monthly		Less than weekly		On 1-2 days per week		On 3-7 days per week	
Alcohol drinking									
1x a week or more often	3857 (7.7)	**1.7 (1.4-2.0)**	1.1 (0.9-1.4)	**3.9 (3.3-4.5)**	**1.4 (1.1-1.8)**	**9.4 (8.1-10.9)**	**2.3 (1.8-2.9)**	**31.6 (27.3-36.6)**	**2.6 (2.1-3.4)**
A couple of times per month	7946 (15.9)	**3.1 (2.8-3.5)**	**1.8 (1.5-2.1)**	**7.8 (6.9-8.7)**	**2.8 (2.3-3.3)**	**15.3 (13.6-17.2)**	**4.0 (3.4-4.8)**	**23.9 (21.2-27.0)**	**4.1 (3.4-4.9)**
Approx. 1x a month	5079 (10.2)	**3.2 (2.8-3.6)**	**2.0 (1.7-2.4)**	**6.8 (6.0-7.8)**	**3.0 (2.5-3.5)**	**11.7 (10.2-13.3)**	**4.1 (3.4-4.8)**	**15.2 (13.2-17.4)**	**3.9 (3.3-4.7)**
Less often	11173 (22.4)	**2.8 (2.6-3.1)**	**2.2 (2.0-2.4)**	**4.8 (4.4-5.1)**	**2.9 (2.6-3.2)**	**6.5 (5.9-7.0)**	**3.5 (3.1-3.9)**	**6.9 (6.3-7.6)**	**3.2 (2.8-3.6)**
Do not use	21857 (43.8)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Drunkenness-related drinking									
1x a week or more often	1733 (3.5)	1.2 (0.9-1.6)	0.8 (0.6-1.3)	**2.7 (2.1-3.6)**	0.9 (0.6-1.3)	**6.8 (5.3-8.7)**	1.1 (0.8-1.5)	**39.3 (31.3-49.4)**	**1.8 (1.3-2.5)**
Approx. 1 - 2x per month	5896 (11.8)	**2.6 (2.2-3.0)**	1.2 (1.0-1.5)	**6.2 (5.4-7.2)**	**1.4 (1.1-1.7)**	**12.3 (10.7-14.1)**	**1.5 (1.2-1.9)**	**23.1 (20.0-26.5)**	**1.6 (1.3-2.0)**
Less often	13144 (26.4)	**3.0 (2.7-3.3)**	**1.3 (1.2-1.5)**	**5.8 (5.3-6.3)**	**1.5 (1.4-1.7)**	**8.9 (8.1-9.7)**	**1.7 (1.4-1.9)**	**11.6 (10.6-12.7)**	**1.7 (1.5-2.0)**
Never	29036 (58.3)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Alcohol and medicine for intoxication									
5x or more	1078 (2.2)	0.9 (0.6-1.3)	0.6 (0.4-1.0)	**2.0 (1.4-2.7)**	1.0 (0.6-1.6)	**3.1 (2.3-4.3)**	1.1 (0.7-1.7)	**17.1 (12.8-22.7)**	1.0 (0.6-1.6)
2-4 times	804 (1.6)	1.5 (1.0-2.1)	0.9 (0.6-1.3)	**2.7 (2.0-3.8)**	1.0 (0.7-1.5)	**3.5 (2.5-4.8)**	0.9 (0.6-1.2)	**8.2 (6.0-11.1)**	0.9 (0.6-1.3)
One time	1456 (2.9)	**1.4 (1.1-1.8)**	0.8 (0.6-1.0)	**2.4 (1.9-3.0)**	0.9 (0.7-1.2)	**3.6 (2.9-4.6)**	0.9 (0.7-1.2)	**7.1 (5.7-8.8)**	1.0 (0.8-1.3)
Never	46770 (93.3)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Medicine for intoxication									
5x or more	920 (1.8)	0.9 (0.6-1.3)	1.0 (0.6-1.6)	1.3 (0.9-1.8)	0.7 (0.4-1.2)	**2.0 (1.5-2.8)**	0.7 (0.4-1.1)	**14.9 (11.2-19.8)**	1.3 (0.8-2.0)
2-4 times	527 (1.1)	1.1 (0.7-1.6)	0.6 (0.4-1.0)	**1.6 (1.2-2.4)**	**0.6 (0.4-0.9)**	**2.4 (1.7-3.4)**	**0.6 (0.4-0.9)**	**6.0 (4.3-8.3)**	0.7 (0.4-1.0)
One time	872 (1.7)	1.2 (0.9-1.6)	0.7 (0.5-1.0)	**1.7 (1.3-2.2)**	**0.6 (0.4-0.8)**	**2.3 (1.8-3.0)**	**0.5 (0.4-0.7)**	**5.0 (3.9-6.4)**	**0.6 (0.5-0.9)**
Never	47748 (95.4)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Glue sniffing									
5x or more	973 (1.9)	0.8 (0.6-1.2)	0.7 (0.4-1.1)	1.4 (1.0-1.9)	0.6 (0.4-1.0)	**2.0 (1.5-2.8)**	0.6 (0.4-1.0)	**14.8 (11.3-19.4)**	1.3 (0.8-1.9)
2-4 times	824 (1.6)	1.3 (1.0-1.9)	0.7 (0.5-1.1)	**2.2 (1.6-2.9)**	0.7 (0.5-1.0)	**3.3 (2.5-4.5)**	0.8 (0.6-1.2)	**7.3 (5.5-9.6)**	1.0 (0.7-1.4)
One time	2303 (4.6)	**1.3 (1.1-1.6)**	0.9 (0.8-1.1)	**2.1 (1.8-2.4)**	1.0 (0.8-1.2)	**2.9 (2.4-3.4)**	1.1 (0.9-1.3)	**4.8 (4.1-5.6)**	1.2 (1.0-1.4)
Never	45990 (91.8)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Drugs									
At least 1x	4680 (9.3)	**1.8 (1.5-2.1)**	1.1 (0.9-1.4)	**3.0 (2.5-3.4)**	0.9 (0.8-1.1)	**4.7 (4.1-5.5)**	1.0 (0.8-1.2)	**12.1 (10.5-14.0)**	1.0 (0.8-1.2)
Never	45418 (90.7)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Note. The reference category for the dependent variable was "I have not gambled during the previous year." Numbers in bold are statistically significant ($p \leqslant .05$). In Model 1, predictor variables were entered into the model one at a time. In Model 2, all predictor variables were included in the model at the same time. In both models, grade level was adjusted.

Appendix B

Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Involvement in Problem Behavior among 14- to 16-Year-Old Girls (N = 50,676) in Relation to Gambling Frequency

Grade and problem behaviors	*N* (%)	Gambling frequency among girls							
		Less than monthly OR (CI)		Less than weekly		On 1-2 days per week		On 3-7 days per week	
Grade level									
8th grade	25179 (49.7)	**0.6 (0.6-0.7)**		**0.6 (0.6-0.7)**		**0.7 (0.6-0.7)**		**0.8 (0.7-0.9)**	
9th grade	25497 (50.3)	1.0		1.0		1.0		1.0	
Problem behavior		**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Truancy									
Over 3 days	1974 (4.1)	**2.2 (1.9-2.4)**	0.9 (0.8-1.1)	**4.0 (3.5-4.6)**	1.0 (0.8-1.2)	**7.5 (6.2-9.0)**	1.2 (0.9-1.4)	**24.7 (20.7-29.4)**	**1.7 (1.3-2.2)**
2-3 days	2560 (5.3)	**1.9 (1.7-2.1)**	0.9 (0.8-1.0)	**3.4 (3.0-3.8)**	1.1 (0.9-1.2)	**5.0 (4.2-6.0)**	1.2 (1.0-1.5)	**7.2 (5.9-9.0)**	1.3 (1.0-1.6)
1 day	5992 (12.5)	**1.8 (1.7-1.9)**	1.1 (1.0-1.2)	**2.7 (2.5-2.9)**	1.2 (1.1-1.3)	**3.7 (3.3-4.3)**	1.4 (1.2-1.6)	**3.7 (3.0-4.4)**	1.1 (0.9-1.3)
None	37465 (78.1)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Bullying									
Several times a week	642 (1.3)	**0.8 (0.7-0.9)**	0.8 (0.7-1.1)	1.1 (0.9-1.3)	**1.6 (1.2-2.1)**	**1.7 (1.3-2.2)**	**2.0 (1.4-2.8)**	**8.5 (7.0-10.3)**	**4.5** (3.2-6.2)
Approximately 1x a week	1223 (2.4)	1.0 (0.9-1.1)	**1.3 (1.1-1.5)**	1.2 (1.0-1.4)	**1.4 (1.1-1.7)**	**1.5 (1.2-1.9)**	**1.8 (1.4-2.4)**	**1.8 (1.4-2.5)**	**2.1** (1.5-2.9)
Less frequently	13486 (26.7)	1.1 (1.0-1.1)	**1.3 (1.2-1.3)**	**1.2 (1.1-1.3)**	**1.5 (1.4-1.6)**	**1.4 (1.2-1.5)**	**1.6 (1.4-1.8)**	1.1 (1.0-1.3)	**1.5** (1.2-1.7)
Never	35231 (69.7)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Delinquency									
Yes	9172 (18.1)	**2.6 (2.4-2.7)**	**1.4 (1.3-1.5)**	**4.5 (4.2-4.9)**	**1.7 (1.6-1.9)**	**6.6 (5.9-7.4)**	**1.8 (1.6-2.1)**	**14.1 (12.4-16.2)**	**2.3 (1.9-2.7)**
No	41481 (81.9)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Smoking									
1x a day or more often	6829 (13.6)	**4.3 (4.0-4.6)**	**1.8 (1.7-2.0)**	**12.4 (11.3-13.6)**	**3.5 (3.1-3.9)**	**28.4 (24.6-32.8)**	**5.7 (4.7-7.0)**	**55.0 (45.2-66.9)**	**5.9 (4.4-8.0)**
1x a week or more often, not daily	2496 (5.0)	**3.0 (2.7-3.3)**	**1.4 (1.3-1.6)**	**7.5 (6.6-8.5)**	**2.4 (2.1-2.8)**	**10.6 (8.6-13.1)**	**2.9 (2.3-3.7)**	**13.6 (10.2-18.1)**	**2.9 (2.0-4.2)**
Less than 1x a week	4922 (9.8)	**2.6 (2.5-2.8)**	**1.3 (1.2-1.4)**	**4.4 (3.9-4.8)**	**1.7 (1.5-1.9)**	**5.4 (4.5-6.6)**	**1.7 (1.4-2.2)**	**4.6 (3.4-6.2)**	**1.5 (1.0-2.2)**
Have quit	6647 (13.2)	**2.3 (2.1-2.4)**	**1.3 (1.2-1.4)**	**3.6 (3.2-3.9)**	**1.7 (1.5-1.9)**	**4.5 (3.7-5.4)**	**1.9 (1.6-2.4)**	**5.2 (4.0-6.7)**	**2.2 (1.6-3.0)**
Do not smoke	29402 (58.5)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Using snuff									
Daily or occasionally	1283 (2.6)	**3.6 (3.0-4.2)**	**1.5 (1.2-1.8)**	**7.7 (6.4-9.3)**	**1.8 (1.5-2.3)**	**17.2 (13.9-21.3)**	**2.8 (2.2-3.6)**	**71.2 (58.4-86.8)**	**5.0 (3.8-6.4)**
Tried it 1x	3294 (6.5)	**2.7 (2.5-3.0)**	**1.3 (1.1-1.4)**	**4.7 (4.2-5.2)**	**1.4 (1.2-1.6)**	**7.5 (6.5-8.7)**	**1.7 (1.4-2.0)**	**10.7 (8.9-12.8)**	**1.8 (1.5-2.2)**
Never	45625 (90.9)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Appendix B. Continued.

Grade and problem behaviors	*N* (%)	Gambling frequency among girls							
		Less than monthly OR (CI)		Less than weekly		On 1-2 days per week		On 3-7 days per week	
Alcohol drinking									
1x a week or more often	2997 (5.9)	**5.1 (4.6-5.6)**	**2.3 (2.0-2.7)**	**16.1 (14.1-18.4)**	**3.3 (2.7-4.1)**	**32.6 (26.6-39.9)**	**2.8 (2.0-3.9)**	**79.4 (62.8-100-3)**	**2.8 (1.7-4.4)**
A couple of times per month	8738 (17.3)	**4.5 (4.2-5.0)**	**2.4 (2.2-2.6)**	**10.6 (9.6-11.7)**	**3.1 (2.6-3.6)**	**16.9 (14.2-20.2)**	**2.8 (2.1-3.8)**	**15.9 (12.6-20.1)**	**2.4 (1.6-3.7)**
Approx. 1x a month	6022 (11.9)	**3.7 (3.5-4.0)**	**2.3 (2.0-2.5)**	**7.6 (6.8-8.5)**	**2.9 (2.5-3.4)**	**9.4 (7.7-11.5)**	**2.4 (1.8-3.2)**	**6.5 (4.9-8.6)**	**1.8 (1.2-2.8)**
Less often	11538 (22.9)	**2.8 (2.6-2.9)**	**2.1 (2.0-2.3)**	**4.0 (3.6-4.4)**	**2.3 (2.0-2.6)**	**4.0 (3.3-4.9)**	**1.8 (1.4-2.3)**	**3.0 (2.3-4.0)**	1.4 (1.0-2.0)
Do not use	21138 (41.9)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Drunkenness-related drinking									
1x a week or more often	1116 (2.2)	**3.9 (3.3-4.6)**	1.1 (0.8-1.3)	**11.4 (9.4-14.0)**	1.0 (0.8-1.4)	**32.4 (25.4-41.4)**	1.5 (1.0-2.2)	**132.0 (104.3-167.0)**	1.7 (1.0-2.7)
Approx. 1-2x per month	6691 (13.3)	**3.8 (3.6-4.1)**	**1.2 (1.1-1.3)**	**9.1 (8.3-9.9)**	**1.3 (1.1-1.6)**	**16.5 (14.2-19.1)**	**1.4 (1.1-1.9)**	**19.7 (16.2-24.0)**	1.3 (0.9-1.8)
Less often	13994 (27.8)	**2.9 (2.8-3.1)**	**1.2 (1.1-1.3)**	**5.2 (4.8-5.6)**	**1.3 (1.2-1.5)**	**7.1 (6.1-8.1)**	**1.5 (1.2-1.8)**	**5.4 (4.4-6.6)**	1.0 (0.7-1.4)
Never	28585 (56.7)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Alcohol and medicine for intoxication									
5x or more	897 (1.8)	**2.2 (1.9-2.6)**	0.8 (0.6-1.0)	**3.5 (2.8-4.4)**	0.7 (0.5-0.9)	**8.1 (6.3-10.5)**	0.7 (0.5-1.0)	**43.5 (35.4-53.5)**	0.7 (0.5-1.0)
2-4 times	1696 (3.4)	**2.8 (2.5-3.2)**	1.1 (0.9-1.2)	**5.1 (4.4-5.9)**	1.0 (0.8-1.2)	**7.5 (6.2-9.1)**	0.9 (0.7-1.2)	**12.8 (10.2-15.9)**	0.9 (0.6-1.2)
Once	3071 (6.1)	**2.5 (2.3-2.7)**	1.1 (1.0-1.2)	**4.2 (3.7-4.6)**	1.1 (0.9-1.2)	**5.9 (5.0-6.9)**	1.1 (0.9-1.3)	**7.6 (6.3-9.3)**	1.0 (0.8-1.3)
Never	44793 (88.8)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Medicine for intoxication									
5x or more	851 (1.7)	**1.7 (1.4-2.1)**	**0.8 (0.6-0.9)**	**2.6 (2.0-3.2)**	0.7 (0.6-1.0)	**6.1 (4.7-7.9)**	1.0 (0.7-1.5)	**31.6 (25.8-38.8)**	1.3 (0.9-2.0)
2-4 times	1248 (2.5)	**2.2 (1.9-2.5)**	0.9 (0.8-1.1)	**3.5 (2.9-4.1)**	0.9 (0.8-1.2)	**4.7 (3.7-5.9)**	0.9 (0.7-1.2)	**7.0 (5.4-9.2)**	0.8 (0.6-1.2)
Once	1805 (3.6)	**1.8 (1.7-2.1)**	0.9 (0.8-1.0)	**2.9 (2.6-3.4)**	0.9 (0.8-1.1)	**3.7 (3.0-4.5)**	0.9 (0.7-1.1)	**5.8 (4.6-7.3)**	1.1 (0.8-1.4)
Never	46502 (92.3)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Glue sniffing									
5x or more	592 (1.2)	**2.1 (1.7-2.6)**	1.1 (0.8-1.4)	**3.4 (2.6-4.5)**	1.0 (0.7-1.4)	**5.2 (3.6-7.6)**	0.8 (0.5-1.3)	**50.5 (40.0-63.7)**	**2.1 (1.5-3.1)**
2-4 times	1237 (2.5)	**2.7 (2.3-3.0)**	**1.3 (1.1-1.5)**	**3.7 (3.1-4.4)**	1.1 (0.9-1.4)	**6.3 (5.0-7.8)**	**1.4 (1.1-1.8)**	**10.4 (8.1-13.4)**	1.3 (1.0-1.8)
Once	2705 (5.4)	**2.1 (2.0-2.3)**	**1.2 (1.1-1.3)**	**3.5 (3.1-3.9)**	**1.4 (1.2-1.6)**	**4.9 (4.1-5.7)**	**1.5 (1.2-1.8)**	**6.7 (5.5-8.2)**	**1.6 (1.3-2.0)**
Never	45905 (91.0)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Drugs									
At least 1x	3349 (6.6)	**2.4** (2.2-2.7)	0.9 (0.8-1.0)	**4.5** (4.0-5.0)	0.9 (0.8-1.0)	**7.7** (6.7-8.9)	1.0 (0.8-1.2)	**21.5** (18.6-24.9)	1.2 (1.0-1.5)
Never	47102 (93.4)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Note. The reference category for the dependent variable was "I have not gambled during the previous year." Numbers in bold are statistically significant ($p \leqslant .05$). In Model 1, predictor variables were entered into the model one at a time. In Model 2, all predictor variables were included in the model at the same time. In both models, grade level was adjusted.