Prevalence estimates of gambling and problem gambling among 13- to 15-year-old adolescents in Reykjavík: An examination of correlates of problem gambling and different accessibility to electronic gambling machines in Iceland

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Abstract

This paper reports the main findings from a prevalence study of adolescent gambling and problem gambling among Icelandic adolescents. The final sample consisted of 3,511 pupils aged 13 to 15 in 25 primary schools in Reykjavík. The results indicated that 93% of adolescents had gambled some time in their life and 70% at least once in the preceding year. Problem gambling prevalence rates were evaluated with two gambling screens, *American Psychological Association Diagnostic and Statistical Manual*, 4th edition, Multiple-Response-Junior (DSM-IV-MR-J) and the South Oaks Gambling Screen Revised for Adolescents (SOGS-RA). The DSM-IV-MR-J identified 1.9% as problem gamblers, while SOGS-RA identified 2.8% as problem gamblers. The results also showed that problem gamblers reported more difficulties in school and used alcohol and other drugs more frequently than adolescents who gambled socially or not at all. Finally, evaluation of electronic gambling machine (EGM) accessibility revealed that gambling on low-stakes EGMs in public places was more common than on EGMs in arcades or bars and restaurants. The potential implications of these findings are discussed.
Key words: adolescent, gambling, problem gambling, electronic gambling machines, EGMs

Introduction

Studies in North America, the United Kingdom, and Australia show that gambling is a common pastime among adolescents, which has led to growing concerns about increased underage gambling in these countries (Delfabbro, Lahn, & Grabosky, 2005; Fisher, 1999; Griffiths, 1995; Hardoon & Derevensky, 2002; Jacobs, 2000, 2004). A recent review of long-term trends in adolescent gambling in North America from 1984 to 2002 suggests a substantial increase in adolescent gambling. For the period from 1984 to 1988, the median level of gambling participation was 45%, but it had risen to a median level of 65% for the period from 1989 to 2002 (Jacobs, 2004). Further, the accumulating evidence for the past 10 years shows that adolescent problem gambling estimates in North America are relatively high, ranging from 2% to 7.4% (Derevensky & Gupta, 2000; Gupta & Derevensky, 1998; Ladouceur, Boudreault, Jacques, & Vitaro, 1999; National Research Council, 1999; Poulin, 2000; Shaffer & Hall, 1996; Westphal, Rush, Stevens, & Johnson, 2000). Studies in other countries such as England, Spain, and Australia show similar prevalence rates, ranging from 2% to 6% (e.g., Becoña, 1997; Delfabbro et al., 2005; Fisher, 1999; Moore & Ohtsuka, 1999; Wood & Griffiths, 1998). A common finding in all these countries is that adolescent boys gamble more widely and more frequently than girls—problem gambling rates are as much as two to three times higher among boys than girls (e.g., Delfabbro et al., 2005; Fisher, 1999; Gupta & Derevensky, 1998; Jacobs, 2000; Stinchfield, 2002).

Studies in the Nordic countries

There is a paucity of research on the prevalence of gambling and problem gambling among adolescents in the Nordic countries. In fact, only three such studies are known to the authors—two from Norway and one from Iceland.

The first Norwegian study included two samples with different data collection formats—telephone interviews and a postal questionnaire. After excluding nonreal dropouts in both samples (see Johansson & Götestam, 2003, for further information), the total response rate in the study was 45.2%. The final combined sample thus consisted of 3,237 adolescents aged 12 to 18 (Johansson & Götestam, 2003). Pathological gambling prevalence was estimated with a 10-item questionnaire based on the *American Psychological Association Diagnostic and Statistical Manual*, 4th edition (DSM-IV). Only those who reported weekly gambling were administered the DSM-IV criteria items. The main finding was that gambling participation was widespread among Norwegian adolescents; about 82% admitted to gambling during the past 12 months and 25% gambled on a weekly basis. Of the total sample, 1.76% were identified as probable pathological gamblers (positive answer to five or more items), with an additional 3.46% as 'at-risk' gamblers (positive answer to three or four items). There were clear gender differences, as weekly gambling was about 2.5 times more likely among boys than among girls. Furthermore, boys (2.79%) were more likely to be classified as probable pathological gamblers than girls were (0.69%).

The second Norwegian study was conducted in 2002 as part of a comprehensive study on the health and lifestyles of almost 13,000 adolescents aged 13 to 19 in 72 primary and secondary schools in Norway (Rossow & Hansen, 2003). The questionnaire was administered during class, and from the 12,923 eligible respondents 11,928 completed the survey (response rate = 92.3%). However, since it was not possible to include a comprehensive instrument on problem gambling in the study, problematic gambling was estimated with the two-item Lie/Bet instrument (Johnson, Hamer, Nora, Eisenstein, & Engelhart, 1997) and an additional item on chasing losses. Lifetime problematic gambling in the study was thus defined as a positive answer to all three items. In terms of gambling participation, the findings from the earlier study were replicated, as 78.5% of the total sample had gambled during the past 12 months. Problematic gambling rates for the total sample were 3.2%, and boys (5.4%) were more likely than girls (1%) to be classified as problematic gamblers (Rossow & Hansen, 2003).

The latest Nordic study was conducted in Iceland in 2003 (Olason, Sigurdardóttir, & Smári, 2006). The study included a convenience sample of 750 students aged 16 to 18 from 12 comprehensive schools. To evaluate problem gambling, the Icelandic versions of two instruments were used, the DSM-IV-Multiple Response-Junior (DSM-IV-MR-J, Fisher, 2000) and the South Oaks Gambling Screen Revised for Adolescents (SOGS-RA) (Winters, Stinchfield, & Fulkerson, 1993). Similarly to the findings in Norway, gambling was common among adolescents, with about 80% gambling during the last 12 months and 10% gambling weekly. There were differences in problem gambling rates between the two instruments. The DSM-IV-MR-J identified 2.0% of the sample as problem gamblers, with a further 3.2% at risk for gambling problems. On the SOGS-RA scale, 2.7% were identified as problem gamblers, with a further 4.4% at risk for gambling problems. Gender differences were observed for both instruments, as boys were four to five times more likely to be classified as problem gamblers than girls were (Olason et al., 2006).

Comparison between the three Nordic studies suggests that gambling is widespread among adolescents in Norway and Iceland. Similar gender differences in gambling were also reported in all three studies, with boys gambling more widely and more frequently than girls.

However, it is difficult to compare problem gambling rates between the three studies, as they differ in choice of instruments, timeframes, and samples. In Norway, the different definitions of problem gambling as well as low response rate in the first study (Johansson & Götestam, 2003) may explain the different problem gambling rates between the two Norwegian studies (1.76% vs. 3.2%). The prevalence rate in the Icelandic study falls between the Norwegian ones, but unlike the Norwegian measures the Icelandic instruments were specifically devised for the adolescent population (Fisher, 2000; Winters et al., 1993). This makes the results from the Icelandic study more easily comparable to other adolescent prevalence studies in a number of different countries (e.g., Becoña, 1997; Delfabbro et al., 2005; Derevensky & Gupta, 2000; Fisher, 1999; Gupta & Derevensky, 1998; Poulin, 2000; Westphal et al., 2000; Volberg, 2002; Wood & Griffiths, 1998). However, it should be noted that the prevalence figures from the Icelandic study are only estimates, as the sample was a rather small convenience sample drawn from a limited number of schools (Olason et al., 2006).

It should also be noted that although the psychometric properties of both DSM-IV-MR-J and SOGS-RA are considered adequate by some researchers (Fisher, 2000; Olason et al., 2006; Poulin, 2002; Winters et al., 1993), questions have been raised regarding the validity of both instruments (e.g., Derevensky & Gupta, 2000; Derevensky, Gupta, & Winters, 2003; Jacques & Ladouceur, 2003; Ladouceur et al., 2000; Langhinrichsen-Rohling, Rohling, Rohde, & Seeley, 2004; Pelletier, Ladouceur, Fortin, & Ferland, 2004; Poulin, 2002). For example, results from some of these studies suggest that SOGS-RA overestimates the prevalence rates among adolescents, possibly because adolescents misunderstand some of the items (e.g., Derevensky & Gupta, 2000; Ladouceur et al., 2000). Interestingly, similar arguments were recently made against the DSM-IV-MR-J (Pelletier et al., 2004). Pending a better-validated problem gambling instrument for adolescents, these two instruments can be regarded as the best approximation available at the moment. However, in light of the controversy regarding the instruments' validity, it is advisable to include both of them in prevalence studies of adolescents. The results from a recent study on problem gambling among Icelandic adolescents also revealed that although the prevalence figures were higher for SOGS-RA than for DSM-IV-MR-J in the study, the concordance between the scales was acceptable (Olason et al., 2006).

Electronic gambling machine participation among Nordic youth

Interestingly, electronic gambling machines (EGMs) are more popular among adolescents in Norway and Iceland than they are in the United States, Canada, and Australia (Delfabbro et al., 2005; Jacobs, 2000; Johansson & Götestam, 2003; Rossow & Hansen, 2003; Olason et al., 2006). In Norway, it was reported to be the most popular gambling game in both studies, and it came second to scratch tickets in Iceland. These results are similar to reports from the U.K., where low-stakes fruit machines are very popular among British adolescents (e.g., Fisher, 1999; Fisher & Griffiths, 1995; Griffiths, 1995; Griffiths & Wood, 2000, 2004). Unlike in the U.K., where low-stakes fruit machines are legal for adolescents, there is an 18-year-old age limit on all EGMs in both Norway and Iceland. Still, as in the U.K., low-stakes EGMs are widely distributed in public places in both countries. It is plausible that the easy access to EGMs in public places, where enforcement of age limits is more difficult than in other venues, explains the popularity of EGMs among adolescents in Norway and Iceland.

Supporting this is the observation that although private games (e.g., cards, board games) are often more popular than commercial games among adolescents, wherever commercial games (such as lotteries) are widely available, youths increase their participation, even though they are not legally permitted to buy these products (Felsher, Derevensky, & Gupta, 2004; Griffiths & Wood, 2000; Jacobs, 2000; Stinchfield, 2002). In Australia, EGMs are restricted to casinos, hotel gaming floors, and clubs that enforce strict 18-year-old age limits to the premises (Delfabbro et al., 2005; Dowling, Smith, & Thomas, 2005), which means that EGMs are less accessible to adolescents in Australia than they are in the U.K., Norway, and Iceland. A recent study on adolescent gambling in the Australian Capital Territory also showed that EGM participation was less common among adolescents than most other gambling activities (Delfabbro et al., 2005).

The current study reports the prevalence rates of gambling and problem gambling among a comprehensive sample of 13- to 15-year-old adolescents in Reykjavík. The relationships between problem gambling and academic achievement, parental and peer gambling, and substance use were also examined. Finally, the question of accessibility of EGMs was examined by comparing the frequency of EGM participation among adolescents in three different locations with differential access.

Method

Participants

In the school year of 2003–2004, approximately 4,659 adolescents in grades 8 to 10 (13- to 15-year-olds) were registered in 30 schools in Reykjavík.[1] Of these 30 schools, 26 can be classified as regular state schools and 4 as private schools. Initially, five schools were excluded from the study as they had very few students in the appropriate age range, and two schools declined to participate.

A total of 3,573 adolescents from 23 schools participated in the study, constituting 77% (3.573/4,659) of all adolescents in this age range in Reykjavík. From the total of 4,199 adolescents registered in the participating schools, 3,511 valid returns were received (62 questionnaires were incomplete). The response rate in the participating schools was 84% (3,511/4,199), varying from 75% to 94% for individual schools. To evaluate the reasons for attrition rates, teachers filled out an attendance form for their students. About 6.1% of the students reported ill on the day of data collection, 2% were absent with permission, and 2% were absent without permission. About 0.5% did not participate because their parents refused their participation. No information exists for only 4.4% of the sample.

Valid returns were received from 1,711 boys and 1,791 girls (9 did not report their gender). The number of participants from each grade level was 1,184 in grade 8, 1,144 in grade 9, and 1,169 in grade 10 (14 did not report their grade level).

Instruments

1. SOGS-RA (Winters et al., 1993). The SOGS-RA is a 12-item modified version of the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987). The SOGS-RA also includes questions on gambling participation and parental gambling. The questions for gambling participation were adjusted to reflect the gambling situation in Iceland. Although there has been some variation between studies in the interpretation of scores from the SOGS-RA (see, e.g., Winters et al., 1993; Winters, Stinchfield, & Kim, 1995;

Langhinrichsen-Rohling et al., 2004), generally a score of 4 or more is labelled 'problem' gambling, a score of 2 or 3 as 'at-risk' gambling, and a score of 0 or 1 as 'no problem' gambling (Wiebe, Cox, & Mehmel, 2000). This method was also adopted in the present study. In prior use, the scale yielded adequate internal consistency measures (α = .80), and the items load on one common factor (Winters et al., 1993). A recent psychometric evaluation of the Icelandic version of SOGS-RA showed an adequate reliability (α = .81), and all items loaded on one common factor (Olason et al., 2006).

2. DSM-IV-MR-J (Fisher, 2000). This is a revised version of the earlier DSM-IV-J gambling screen for adolescents (Fisher, 1992, 1993). The DSM-IV-MR-J includes 12 items that measure 9 out of 10 criteria for DSM-IV diagnosis of adult pathological gambling: (1) preoccupation with gambling, (2) tolerance, (3) loss of control, (4) withdrawal, (5) escape, (6) chasing, (7) lies, (8) illegal and unsocial acts, and (9) risked job, education, or relationship. Most items are given four response options: 'never', 'once or twice', 'sometimes', or 'often.' Generally, a score of 4 or more from the nine DSM criteria items suggests 'problem' gambling, a score of 2 or 3 suggests 'at-risk' gambling, and a score of 0 or 1 suggests 'no problem' gambling. The internal consistency reliability for this scale is satisfactory (α = .75), and the items load on one common factor (Fisher, 2000). Further, a recent psychometric evaluation of the Icelandic version of DSM-IV-MR-J confirmed that the scale has adequate reliability (α = .78), and all items loaded on one common factor (Olason et al., 2006).

3. Substance use. Eight questions were used to evaluate the frequency of smoking and alcohol and drug use during the past 12 months before the study. Respondents replied to all substance use questions on the same 7-point frequency scale ranging from 1 ('never') to 7 ('about daily'), except smoking, which was answered on a 3-point scale, 1 ('never'), 2 ('yes but less than daily'), and 3 ('about daily').

Procedure

After consent was obtained from the Icelandic Data Protection Authority and from the relevant school authorities, parents were sent a letter in which the research objectives were described and an opportunity to reject children's participation was given. Data collection was subsequently arranged in cooperation with each school's authorities and teachers. The questionnaire was always administered to students during lessons, and a trained researcher was present in most instances. In a few instances where this was not possible, teachers were given guidelines on how to present the questionnaire in the classroom.

All students attending lessons on the day of data collection received the same general information before they answered the questionnaire and were instructed to answer individually. Participation was voluntary and the students were ensured confidentiality and were specifically asked not to provide their names or other personal identification information. They were also told that they could terminate their participation at any time without any consequences.

Results

Gambling participation

From the total adolescent sample, 93% reported having gambled at least once in their lifetime, almost 70% had gambled during the previous 12 months, and 8% had gambled at least once a week for the preceding 12 months. Boys (79.4%) were more likely than girls

(60.2%) to have gambled during the previous year (χ^2 (1, N = 3502) = 150.30, $p \leq .001$), and students in grade 10 (73.6%) were more likely to have gambled than students in grades 8 (67.4%) and 9 (67.7%) (χ^2 (2, N = 3497) = 13.43, $p \leq .01$).

The most popular gambling activities among the entire adolescent sample in the 12 months prior to the study were scratch tickets (48.2%), followed by EGMs (32.0%) and Lotto (28.1%). Interestingly, playing gambling games on the Internet without betting real money (25%) was surprisingly common among the adolescents. Table 1 presents the frequency figures for different types of gambling classified by gender and grade.

Table 1.

Frequency of gambling during the previous 12 months by gender and school grade

	Gender		Grade		
Gambling activity	**Boys** (n = 1,711)	**Girls** (n = 1,791)	**Grade 8** (n = 1,184)	**Grade 9** (n = 1,144)	**Grade 10** (n = 1,169)
Scratch tickets	54.7	42.0**	47.3	48.8	48.4
Gambling machines	46.0	18.7**	25.9	28.2	41.5**
Lotto	31.9	24.2**	27.0	26.6	30.4
Games of skill	35.4	16.7**	24.0	26.2	27.2
Card games	36.9	14.2**	21.9	25.0	29.1**
Internet gambling without betting money	36.4	13.9**	22.5	24.8	27.3*
Football pools	30.7	4.6**	16.2	17.6	18.1
Sport betting	23.4	2.3**	10.5	13.0	14.3*
Bingo	15.2	10.3**	14.2	11.1	12.6
Internet gambling with money	3.1	0.8**	2.6	1.5	1.5

Note. All table values are percentages. ** $p \leq .01$; * $p \leq .05$

Boys were more likely than girls to play all types of gambling. The difference was greatest for sports betting, as boys were about 7 to 10 times more likely to bet on the outcome of sporting events than girls were. There was little difference between grades for most types of gambling activity except the EGMs and card games, where participation was higher in grade 10 than in grades 8 and 9 (see Table 1).

Problem gambling

To examine possible order effects for the rates of problem gambling as measured either by SOGS-RA or DSM-IV-MR-J, the order of administration of the two instruments was counterbalanced. No significant differences between orders were found for SOGS-RA (t (3478) = .636, p = .525) or for DSM-IV-MR-J (t (3480) = .045, p = .964). This shows that the order of the two measurement instruments for problem gambling in the questionnaire did not influence the problem gambling rates.

Subsequently, the problem gambling estimates were calculated. There were differences in problem gambling rates between the two instruments. The DSM-IV-MR-J identified 1.9% of the sample as problem gamblers with a further 3.7% at risk for gambling problems, and the SOGS-RA identified 2.8% as problem gamblers with a further 4.1% at risk for gambling problems (see Table 2).

Table 2.

Problem gambling by gender and grade: Comparison between SOGS-RA and DSM-IV-J-MR

Instrument	Nongambler % (*n*)	Social gambler % (*n*)	At-risk gambler % (*n*)	Problem gambler % (*n*)
SOGS-RA				
Gender				
Boys	20.8 (353)	67.5 (1144)	6.4 (108)	5.3 (90)
Girls	39.8 (711)	57.8 (1031)	2.0 (35)	0.4 (8)
Grade				
8	32.9 (385)	60.7 (709)	3.8 (45)	2.6 (30)
9	32.4 (370)	61.0 (697)	4.2 (48)	2.4 (27)
10	26.5 (309)	65.7 (765)	4.3 (50)	3.4 (40)
Total	**30.6 (1,064)**	**62.5 (2,175)**	**4.1 (143)**	**2.8 (98)**
DSM-IV-MR-J				
Gender				
Boys	20.8 (353)	68.8 (1168)	7.0 (118)	3.4 (58)
Girls	39.9 (711)	59.1 (1054)	0.6 (11)	0.4 (7)
Grade				
8	32.9 (385)	62.6 (732)	2.7 (32)	1.8 (21)
9	32.5 (370)	62.1 (708)	4.1 (47)	1.3 (15)
10	26.5 (309)	66.7 (777)	4.3 (50)	2.5 (29)
Total	**30.6 (1,064)**	**63.9 (2,222)**	**3.7 (129)**	**1.9 (65)**

Boys had more gambling problems overall than girls (SOGS-RA (χ^2 (3, N = 3480) = 230.03, $p \leq .001$), DSM-IV-MR-J (χ^2 (3, N = 3480) = 253.10, $p \leq .001$)) and were about 8.5 (DSM-IV-MR-J) to 13 (SOGS-RA) times more likely to be classified as problem gamblers than girls were. For both measures, similar findings were observed for grades, where the rate of problem gambling was similar in grades 8 and 9 but jumped considerably in grade 10 (SOGS-RA (χ^2 (6, N = 3475) = 15.51, $p \leq .05$) and DSM-IV-MR-J (χ^2 (6, N = 3475) = 20.84, $p \leq .01$)).

Overall, these results indicate that although DSM-IV-MR-J is a more conservative measure of problem gambling than SOGS-RA, both show the same gender and developmental differences.

It is worth noting that the concordance between the two measures seems to be better for girls than for boys, as both DSM-IV-MR-J and SOGS-RA identify 0.4% of girls as problem gamblers (see Table 2). The overlap between the two scales was further examined by cross-tabulating them for boys and girls separately. As expected, there was considerable incongruence between instruments for boys. Of the total number of individuals classified as problem gamblers by either measure (n = 103), only 44 (42.7%) were classified as problem gamblers by both instruments. However, from the total number of problem gamblers for girls (n = 9), six (67%) were classified as problem gamblers by both instruments. Consequently, the Kappa statistic was considerably higher for girls (κ = .80) than for boys (κ = .58).

Correlates of problem gambling

In the following analyses including problem gambling, the DSM-IV-MR-J was used to classify the problem gambling groups.[2] Adolescents who gambled were asked about the age at which they first started gambling. Overall, the mean age of gambling onset was 9.5 years and there were no differences found for gender ($t(2117) = 1.287$, $p = .119$). Surprisingly, analysis for problem gambling revealed that there were no differences in age of gambling onset for gambling severity ($F(2, 1776) = 1.699$, $p = .183$). However, adolescents with gambling problems were more likely to remember a big win from the time they started to gamble ($\chi^2(2, N = 2391) = 160.40$, $p \leq .001$) than adolescents who gambled without problems.

The adolescents were also asked if their parents and peers gambled and if they thought that their parents or peers gambled too much. Notably, many adolescents reported that they did not know if their parents (17%) or peers (29%) gambled, and these were not included in the following analysis. Adolescents with gambling problems were more likely than other gambling groups to report that their parents ($\chi^2(2, N = 2003) = 16.11$, $p \leq .001$) and peers ($\chi^2(2, N = 1707) = 126.37$, $p \leq .001$) gambled. Further, about 10% of the problem gambling group and 5% of the at-risk group reported that their parents gambled too much, whereas only 2% of the social gamblers did so ($\chi^2(2, N = 2211) = 15.57$, $p \leq .001$). These differences between gambling groups were substantially greater for peer gambling ($\chi^2(2, N = 1890) = 77.82$, $p \leq .001$), where about 41% of the problem gamblers and 22% of those who are at risk for problem gambling reported that their peers gambled too much, but only 8% among the social gamblers.

Students were also asked three questions related to their academic performance. First, the students were asked about the average grades from their last exams. Second, the students were asked to evaluate how well they were doing at school, and finally they reported the average number of times they skipped classes every week. The results revealed that the problem gambling group reported lower grades ($F(3, 3057) = 32.87$, $p \leq .001$), were unhappier with their overall school performance ($F(3, 3473) = 35.77$, $p \leq .001$), and played truant more often ($F(3, 3459) = 113.32$, $p \leq .001$) than other gambling groups.

Finally, the students also responded to eight questions regarding their use of drugs and alcohol. About 4.9% of the adolescents smoke daily, 12.2% drink wine or beer and 5.8% strong alcohol once a month or more, 7.4% get drunk once a month or more, and 5.3% reported that they had smoked cannabis at least once in the previous year. Table 3 presents the frequency of substance use for each problem gambling group.

Table 3.

Frequency of substance use classified by problem gambling groups according to the DSM-IV-MR-J

Substance	Nongambler (*n* = 1,064)	Social gambler (*n* = 2,222)	At-risk gambler (*n* = 129)	Problem gambler (*n* = 65)
Smoking**				
Never	93.9	89.0	73.6	53.8
Less than daily	3.8	6.3	13.2	7.7
Daily	2.3	4.7	13.2	38.5
Beer/Wine**				
Never	71.9	48.9	20.9	15.6
Few times a year	22.8	37.7	51.9	26.6
Monthly or more	5.3	13.4	27.1	57.8
Strong alcohol**				
Never	87.1	72.5	43.8	32.3
Few times a year	11.1	21.5	37.5	29.2
Monthly or more	1.8	6.0	18.8	38.5
Getting drunk**				
Never	87.9	75.1	47.3	41.5
Few times a year	9.2	17.3	31.8	12.3
Monthly or more	2.9	7.6	20.9	46.2
Cannabis**				
Never	98.2	94.5	86.0	64.5
At least once	1.8	5.5	14.0	35.5
Hard drugs[a]**				
Never	99.2	95.8	85.3	63.1
At least once	> 1	4.2	14.7	36.9

Note. All table values are percentages. ** $p \leq .01$; [a]Hard drugs is a combined variable for the use of amphetamines or Ecstasy, and inhalation of gas or glue.

Not surprisingly, a linear relationship between severity of problem gambling and substance use emerges. Problem gambling youths are more likely to smoke daily, drink alcohol, and get drunk on a regular basis than those who do not gamble or gamble without problems. Further, about a third of the problem gambling group had used cannabis or hard drugs at least once during the 12 months before the study, but this activity was infrequent among adolescents that gamble socially or not at all. There is also a substantial difference between the problem gambling group and the at-risk gambling group, as adolescents who are problem gamblers use all substances two to three times more often than the group that is at risk for problem gambling (see Table 3).

Accessibility to EGMs

Examining regular (weekly or more) gambling participation for different gambling activities revealed that problem gamblers were more likely to gamble regularly on all activities than other problem gambling groups ($p \leq .001$). Further analysis also showed that problem gamblers play an average of two games on a regular basis (weekly or more), which is significantly more than is found among the at-risk (M = 1.4 games) or the social gambling (M = 0.12 games) groups ($F(2, 2420) = 361.24$, $p \leq .001$). Interestingly, EGMs were the most popular regular game among the problem gamblers (41%), followed by card playing (28%),

scratch cards (25%), sports betting (22%), and gambling on the Internet without betting money (21%).

EGMs can be found in different types of locations in Iceland. Low-stakes machines are in many public places, such as kiosks, fast-food restaurants, and video rental stores. Secondly, arcades and bars and restaurants (with an alcohol licence) have both low- and higher-stakes machines. Although alcohol is not sold in the arcades, both arcades and bars have an entrance age limit of 18 years. It should be stressed that all EGMs, independent of location, have an age limit of 18 years in Iceland.

To investigate if EGM participation differs between locations and types of machines, those adolescents who reported EGM participation during the 12 months before the study were asked how frequently (5-point frequency scale ranging from 1 ('never') to 5 ('very often')) they played the EGMs in these three different locations. The results are presented in Table 4.

Table 4.

Frequency of EGM participation classified by problem gambling groups according to the DSM-IV-MR-J

	Gambling frequency		
Location	**Never**	**Seldom**	**Frequently**
EGM in public locations			
Social gambler	6.9	77.7	15.5
At-risk gambler	–	58.9	41.1
Problem gambler	1.8	35.7	62.5
Total	**5.9**	**73.5**	**20.7**
EGM in arcades			
Social gambler	60.0	37.3	2.7
At-risk gambler	33.3	56.5	10.2
Problem gambler	9.3	51.9	38.9
Total	**54.6**	**40.1**	**5.3**
EGM in restaurants/bars			
Social gambler	78.7	19.7	1.6
At-risk gambler	44.4	48.1	7.4
Problem gambler	28.6	46.4	25.0
Total	**72.6**	**24.0**	**3.4**

Note. All table values are percentages.

Overall, adolescents gamble more frequently on low-stakes EGMs in public locations (94.2%) than they do in arcades (45.4%) or restaurants and bars (27.4%). Frequent participation was also considerably higher in public locations than other locations (see totals in Table 4). Examining the relationship between problem gambling and gambling frequency revealed that problem gamblers gamble more frequently than other groups on EGMs in public locations ($\chi^2(4, N = 1036) = 105.95$, $p \leq .001$), in arcades ($\chi^2(4, N = 1051) = 175.17$, $p \leq .001$), and in restaurants/bars ($\chi^2(4, N = 1058) = 167.02$, $p \leq .001$). The adolescents were also asked if their parents knew that they were betting on EGMs. Interestingly, about 57% of

the adolescents who replied to the question acknowledged that their parents knew about their EGM participation, and there was no difference between the problem gambling groups ($\chi^2(2, N = 888) = 1.03$, $p = .598$).

Discussion

The overall pattern of gambling participation among 13- to 15-year-old adolescents in Reykjavík shares many similarities with results obtained elsewhere (Delfabbro et al., 2005; Fisher, 1999; Hardoon & Derevensky, 2002; Jacobs, 2000, 2004; Johansson & Götestam, 2003; Olason et al., 2006; Rossow & Hansen, 2003). The majority of youth in Reykjavík have gambled some time in their lives, and about 70% have done so during the past 12 months. Similarly to the findings in Norway, boys gamble more widely and more frequently than girls, and the types of games that are most popular among Icelandic adolescents are commercial games such as scratch cards, EGMs, and the national lottery. Gambling participation is slightly less than reported in the earlier studies in Norway and Iceland (Johansson & Götestam, 2003; Olason, Sigurdardottir, & Smari, 2006; Rossow & Hansen, 2003), but the present sample is considerably younger and it is likely that gambling participation will increase with age. In fact, some evidence for this can be seen in the present study, where gambling involvement jumped considerably from grades 8 and 9 to grade 10.

Prevalence of problem gambling in the Nordic countries

The prevalence estimates for problem gambling obtained in this study are similar to prevalence figures reported in the earlier studies in Norway and Iceland, but somewhat lower than is typically reported in studies from North America, Britain, and Australia (e.g., Delfabbro et al., 2005; Fisher, 1999; Derevensky & Gupta, 2000; Gupta & Derevensky, 1998; Johansson & Götestam, 2003; NRC, 1999; Olason et al., 2006; Rossow & Hansen, 2003; Shaffer & Hall, 1996). Studies on the adult populations in Sweden, Norway, and Iceland also report slightly lower prevalence figures (0.15%–0.6%) of pathological gambling than is commonly reported in North America, Britain, Spain, or Australia (Becoña, 1996; Götestam & Johansson, 2001; Olason, Finnbogadóttir, Hauksdóttir, & Bárudóttir, 2003; Olason, Bárudóttir, & Gretarsson, 2005; Orford, Sproston, Erens, White, & Mitchell, 2003; Productivity Commission, 1999; Shaffer, Hall, & Vander Bilt, 1999; Volberg, Abbott, Rönnberg, & Munck, 2001). This suggests that the prevalence of problem gambling among adolescents and adults is less widespread in the Nordic countries than elsewhere. However, more research on both adult and adolescent problem gambling prevalence must be conducted within the Nordic countries to confirm the present results, particularly in Denmark, Finland, and Sweden, where no published studies on the prevalence of adolescent problem gambling exist.

The findings of this study reveal that Icelandic adolescents begin to gamble early (M = 9.5 years), a worrisome finding since early onset of gambling has been shown to be a risk factor for problem gambling (Jacobs, 2004). The comparison between problem gambling groups did not show a significant difference in age of onset in this study, but the likely reason for this is the delay between onset of gambling and problem gambling. The participants in this study were only 13 to 15 years old and therefore had a relatively short gambling history.

The results also show that problem gamblers report more difficulties in school (lower grades and truancy) and use alcohol and other drugs more frequently than adolescents who gamble socially or not at all. Further, problem gamblers more often reported that their parents and

peers gamble excessively than did other problem gambling groups. Such findings are commonly reported in the gambling literature and show that problem gambling is an indicator of broader difficulties in social and psychological adjustment of adolescents in different cultures (Delfabbro et al., 2005; Fisher, 1999; Griffiths & Sutherland, 1998; Gupta & Derevensky, 1998; Ladouceur et al., 1999; Vachon, Vitaro, Wanner, & Tremblay, 2004; Westphal et al., 2000; Winters, Arthur, Leitten, & Botzet, 2004).

Accessibility to EGMs

The popularity of EGMs among Icelandic adolescents is of concern. Almost one third of the 13- to 15-year-olds reported that they had played on EGMs during the past year. Boys were more involved than girls, and there was also a considerable increase in EGM participation from grades 8 (26%) and 9 (28%) to grade 10 (41%). EGM involvement also seems to continue to rise in older age groups, as about 48% of 16- to 18-year-olds reported that they had played on EGMs (Olason et al., 2006).

The findings of this study also revealed that low-stakes EGMs located in public places (kiosks, fast-food restaurants, video rental stores) are the predominant venues for adolescent EGM gambling. This indicates that the 18-year-old age limit on EGM gambling is particularly difficult to maintain in public places, even though the staff at such venues are equipped with remote controls to turn off the EGMs if they suspect the players to be under the legal age.

In venues such as arcades, bars, and licensed restaurants, where adolescents are usually not allowed (except when accompanied by adults), the enforcement of the age restrictions is easier. The findings of this study support this, as fewer adolescents report frequent EGM play in these venues than in the public places. However, adolescents do play gambling machines, even though the gambling machines are in venues such as arcades and bars and restaurants. In this study, about 45% reported that they had played in arcades and about 28% in bars or restaurants. Further, almost 60% of the adolescents that play gambling machines reported that their parents knew about their EGM gambling. These findings show that the enforcement of age restrictions in these venues is not satisfactory and that parents must be educated on the risks of EGM gambling for adolescents.

The popularity of EGMs among adolescents in Norway and Iceland is worrying. Although no conclusive evidence exists for the claim that EGMs are more addictive than other gambling games, there is general acceptance that EGMs are strongly associated with problem gambling (Dowling et al., 2005). For example, research on adolescent gambling in the U.K. shows that problem gambling among EGM players is relatively high (5%–6%), and EGMs seem to be the most predominant form of gambling reported in self-help groups and treatment centres in the world (Becoña, 1996; Dowling et al., 2005; Fisher, 1999; Griffiths, 1995, 1999; Griffiths & Wood, 2000, 2004). The results of this study support the link between EGMs and problem gambling, as EGM gambling was the most common regular (once a week or more) game played by adolescent problem gamblers (41%) in Reykjavík.

In conclusion, this study shows that most Icelandic adolescents gamble, and an estimated 1.9% to 2.8% are in trouble due to their gambling participation. The availability of gambling machines in public places is a matter of concern for the Icelandic community and must be addressed with stricter enforcement of the 18-year-old age limits. Further, the apparent success of the Australians in restricting adolescent gambling on EGMs suggests that the authorities in Iceland and Norway should seriously consider prohibiting the distribution of

gambling machines in public places.[3] Of course such measures are not likely to significantly reduce the prevalence of problem gambling in these countries, as adolescents would find other outlets for their gambling activities. Neither would it stop all adolescents from playing the gambling machines, but it would very likely decrease the number of adolescents being introduced to serious forms of commercial gambling too early in their lives.

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[1] This amounts to 33% of all 13 to 15 year old adolescents living in Iceland in December 2003.

[2] The results for SOGS-RA were in general very similar to the findings from the DSM-IV-MR-J.

[3] This statement is based on the results from one study in Australia (Delfabbro et al., 2005). Further evidence for the success of restricted adolescent access to EGMs in Australia is needed.